FUTURES INDUSTRY ASSOCIATION DISASTER RECOVERY TEST

2017 EXERCISE RESULTS

"DR XV"

October 2017

MARKET TECHNOLOGY DIVISION

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I. BACKGROUND

- The FIA Market Technology Division, successfully conducted its fourteenth (14th) annual continuity of business and disaster resilience test on October 14th, 2017.

- In Q2 2017, the FIA Business Continuity Management committee launched initial preparations for the annual industry-wide test, which benefited from prior years' exercises and experience

- A working group convened to plan, discuss and agree on a 2017 calendar, goals, objectives, and to provide general perspective and guidance.

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BACKGROUND (Cont'd) …

- Conference calls were held bi-weekly and weekly, between April and October 2017

- Two webinar symposiums were conducted in June and September 2017. Exchanges and clearinghouses presented to representatives of various clearing and non-clearing firms

- Participating exchanges and clearinghouses included:

BGC Partners Inc.
BME Clearing
Cámara de Riesgo Central de Contraparte de Colombia
Canadian Derivatives Clearing Corporation
CBOE Futures Exchange
CME Group
Dubai Mercantile Exchange
Eris Exchange
Eurex
ICE Clear Credit
ICE Clear Canada
ICE Clear Europe
ICE Clear Singapore
ICE Clear U.S.
ICE Exchanges
LCH Clearnet
Mercado Español de Futuros Financieros
Minneapolis Grain Exchange
Montreal Exchange
Nodal Exchange/Clear
OneChicago
Options Clearing Corporation
Traiana
trueEX DCM/SEF

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BACKGROUND (CONT'D) …

- The scope of the disaster recovery test initiative was designed to test business continuance, process recovery and disaster resilience connectivity, and functionality between exchanges, clearinghouses, and member firms by:
  - Verifying firms' ability to test their business continuance (i.e., the people side) from alternate work recovery sites
  - Testing firm back-up to exchanges and clearinghouses back-up sites (DR-to-DR)
  - Verifying connectivity and process recovery
  - Testing round-trip communications capabilities

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BACKGROUND (Cont'd) …

- Regular FIA disaster recovery test conference calls included representatives from:
  - Clearinghouses
  - Exchanges
  - Swap Execution Facilities (SEFs)
  - Futures Commission Merchants (FCMs)
  - Clearing firms
  - Non-Clearing firms
  - Key service providers
  - Independent software vendors (ISVs)

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II. EXECUTIVE SUMMARY

- The fourteenth annual industry-wide disaster recovery test, with a primarily focus on the U.S. financial services sector, was very successful. This is largely in part to an excellent coordinating and working relationship between exchanges/clearinghouses, firms, and service providers

- 24 Major U.S. and international futures exchanges, clearinghouses, swap execution facilities participated

- 66 FCMs, clearing firms and non-clearing firms and 7 key service providers participated

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EXECUTIVE SUMMARY (CONT'D) …

- Between **83% -100%** of firms tested successfully, depending on the exchange, meaning that they were able to successfully fulfill, from end-to-end, the instructions outlined within test scripts

- The exchanges and clearinghouses demonstrated that their systems, processes and procedures simultaneously worked well, communicating from back up systems/sites.

- As in prior years, firms and exchanges tested the "people side" of their business continuance capabilities, as well as the disaster resilience and recovery of their systems infrastructure

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EXECUTIVE SUMMARY (CONT'D) …

- Overall test orchestration, facilitation and order entry was conducted from alternate work sites, as well as DR data centers
- Working from alternate work sites was an option for numerous test participants. Some firms had test staff working remotely from home
- As in prior years, exchanges reported that some firms registered for the test but did not participate. Likewise, some firms did not register but appeared on test day.

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EXECUTIVE SUMMARY (CONT'D) …

- Firms have indicated that the test helps them:
  - Exercise their business continuance/disaster resilience plans (BCPs)
  - Identify internal and external single points of failure
  - Test other in-house applications and systems at the same time
  - Tighten up and improve the documentation of their business continuity procedures
  - Better understand the need for cross-training
  - Test connectivity to exchange/clearinghouse and/or SEFs DR sites

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III. CONTINUITY OF OPERATIONS

- The scope of additional business continuance activities by participants, in conjunction with the exercise, includes:
    - Relocating staff and test management to alternate works sites
    - Managing the test from alternate sites or home locations
    - Failing over mission critical systems and remaining in back up mode for longer than the test duration
    - Conducting other BCM activities such as cross training and updating relevant documentation and procedures

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CONTINUITY OF OPERATIONS (CONT'D) …

- As in prior years, respondents indicated that multiple departments were involved with the planning and execution of the test, and that separate teams also staffed the SIFMA Disaster Recovery Test, which occurred on the same day

- Following a post-mortem on November 1st, it was determined that a survey should be conducted to assess potential changes to the 2018 and 2019 DR Tests

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ALTERNATE WORK SITES WERE GEOGRAPHICALLY DISPERSED

- **U.S. States and Canadian Provinces:**
  - Connecticut, Florida, Illinois, Minnesota, Missouri, New Jersey, New York, North Carolina, Texas
  - Mississauga, Montreal, Toronto, Vancouver, and Winnipeg
- **International Cities**:
  - Barcelona, Bogotá, Dubai, London, Madrid, Paris, and Tel Aviv.

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IV. OVERALL TEST RESULTS

- 24 domestic and international futures exchanges, clearinghouses, swap execution facilities and 66 clearing/non-clearing firms* participated in the test
- Test participants included clearing firms, non-clearing firms and trading participants
- Between 7% and 87% of member futures clearing firms participated, across the various exchanges/clearinghouses
- Participating firms represent a significant critical mass of derivatives order flow and liquidity at the major exchanges; 37% - 98% of exchanges' volume.

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* Some firms are common members of multiple exchanges

OVERALL TEST RESULTS (Cont'd)…

- The **National Futures Association** successfully received regulatory file uploads from an exchange for which it performs outsourced regulatory compliance

- **Traiana** successfully performed credit checking services with FCMs and Swap Execution Facilities via its Limit Hub

- The test was supported by a number of the major service providers:

- CQG	- ION Trading
- Fidessa	- Stellar Trading Systems
- FIS/Sungard	- Trading Technologies

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BGC DERIVATIVES MARKETS

- Successfully tested firms' connectivity and ability to enter orders and receive trade confirms from back up facilities
- Tested failover from production Site I to back up systems at Site II
- Participants confirmed connectivity after failover from production to the backup site
- Tested US IRS, FX, US Treasury Swaps, repo and Credit products
- Participants successfully confirmed receipt of acknowledge trade confirms via BGC Rates, BGC Credit, BGC Trader, in-house application or STP applications.

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CANADIAN DERIVATIVES CLEARING TMX GROUP

- Tested via their Toronto back up site
- Trades and positions created by Bourse de Montreal flowed to CDCC via the Clearing Manager of SOLA® Clearing.
- FTP Server and FIXML access were included within scope of the test
- Reports were generated and uploaded to participating Clearing Members under a specified DR Test directory.

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CBOE FUTURES EXCHANGE

- Tested via member firms' back up connectivity to back up CBOE Command back up ETS trading platform
- Scripted trade entry for VIX futures contracts
- Firms tested web-based applications such as Market Replay and Risk Controls
- Transmitted trades to/from the OCC's back up systems via MQ and SFTP
- Transmitted regulatory data to NFA's back up site via SFTP.

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CME GROUP / CME CLEARING

- Tested member firms back-up connectivity to the back up CME Clearing and GLOBEX trading platform via CME's remote DR data center
- Simulated a disruption of metropolitan Chicago (including GLink and LNET); a second scenario included recovering LNET and GLink
- The test was designed for firms to enter a meaningful script of orders/trades that are reflective of their business
- Received ex-pit, block trade information via CME remote site portal URL
- For clearing, re-published trade registers and SPAN files from 10/24 trade date
- Received PCS and large trader information from member firms
- Transmitted trade registry data and SPAN files via SFTP.

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CÁMARA DE RIESGO CENTRAL DE CONTRAPARTE DE COLOMBIA (CRCC)

- Failed-over the Colombia XV production data center to the Ortezal back up data center
- Test participants included Bolsa de Valores de Colombia (BVC), local broker firms and the Colombia Central Bank
- BVC and firm communications were re-directed to the back up data center
- All affiliates participated and all operations were real

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ERIS EXCHANGE

- Tested an outage scenario that reflected a loss of the primary matching engine and primary post-trade processing system
- The test validated trade data and customer account setup in DR environment
- Systems used in testing were SwapBook Central Limit Order Book and post trade SFTP file delivery system
- Firms successfully tested file and data transfer from the backup site.

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EUREX

- Tested an outage scenario that reflected the loss of the primary data center, taking the T7 production matching engine, production gateways and customer co-location site offline
- The test validated trade data and customer account setup in the DR environment:
    - T7 trader GUI login to the DR landing page/test message
    - MDI, EMDI multicast groups and receipt of market data and/or technical heartbeats
    - ETI session login
    - Order and quote management functions
    - Trade matching

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ICE CLEAR US

- Tested member firms' back-up connectivity to the ICE electronic trading system DR site
  - Firms entered test trades – refer to the ICE Exchanges slide.
- Test trades from the ICE trading system flowed to clearing systems
- Tested member firms' back-up connectivity to the ICE clearing system DR site
- Members tested ECS, MFT, PTMS/ACT and MQ
- Trade messages were sent via FIXML MQ to Clearing Members
- Trade allocation instructions were entered in PTMS/ACT
- Clearing files were submitted and retrieved via MFT
  - Match-off files, reports, Large Trader, PCS, GCM

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ICE EXCHANGES

- Tested member firms' back-up connectivity to the ICE Exchange electronic trading system DR site
- Scripted order entry for Canola, Dollar Index, Mini Brent, Sugar, Three Month Euribor and WTI futures contracts
- Tested Web ICE, ICE Block, FIX, Pricefeed and other non trading functionality from the DR site
- WebICE reporting via Internet portal for deal reporting, position reports, etc.

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ICE CLEAR CANADA

- Tested member firms' back-up connectivity to the ICE electronic trading system DR site
  - Firms entered test trades – refer to the ICE Exchanges slide.
- Test trades from the ICE trading system flowed to clearing systems
- Tested member firms' back-up connectivity to the ICE clearing system DR site
- Members tested ECS, MFT, PTMS/ACT and MQ
- Trade messages were sent via FIXML MQ to Clearing Members
- Trade allocation instructions were entered in PTMS/ACT
- Clearing files were submitted and retrieved via MFT
  - Match-off files, reports, Large Trader, PCS.

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ICE CLEAR CREDIT

- Tested Clearing Participants' connectivity to the ICE Clear Credit DR site
- Clearing Participants' accessed the following systems:
  - Managed File Transfer Download and Upload systems
  - ECS Banking UI
  - FIX Pricing API and PACE UI
  - Risk API
- Files were downloaded and retrieved via SFTP.

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ICE CLEAR EU

- Tested member firms' back-up connectivity to the ICE electronic trading system DR site
  - Firms entered test trades – refer to the ICE Exchanges slide.
- Test trades from the ICE trading system flowed to clearing systems
- Tested member firms' back-up connectivity to the ICE clearing system DR site
- Members tested ECS, MFT, PTMS/ACT and MQ
- Trade messages were sent via FIXML MQ to Clearing Members
- Trade allocation instructions were entered in PTMS/ACT
- Clearing files were submitted and retrieved via MFT
  - Match-off files, reports, Large Trader, PCS.

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LCH CLEARNET

- The test scenario simulated an outage the London primary data center
- SwapClear LTD and MemberWeb system access operated via the backup data center
- Some, but not all, customers were able to connect to the backup data center. Successful customers were able to connect without any changes to their systems as cutover was seamless using the same IP Addresses and access methods.

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MEFF, BME CLEARING

- Tested via the MEFF production SMART ETS environment
- Simulated a failure of the Madrid Las Rozas main data center, including co-located member's appliances
- MEFF and BME Clearing both failed over to their backup systems
- Members entered trades and received reports
- BME Clearing successfully participated in the test
- Transfer files were available on request
- Clearing data was restricted and not sent to member firms' back office systems.

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MINNEAPOLIS GRAIN EXCHANGE

- Trades were entered for MGEX products into the CME GLOBEX platform and MGEX TEMS system
- Trades were processed by MGEX Clearing via the MGEX DR site
- TREX trade files were generated by the MGEX DR Clearing Server and placed on the MGEX DR FTP server
- The MGEX DR remote access and FTP servers were accessible with the same logins and passwords as the production system.

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MONTREAL EXCHANGE/TMX GROUP

- Tested the SOLA® Trading electronic system via the Toronto back up site
- MX provided automated market volume for bid/offer on selected instruments in the back-up environment
- Trades were transmitted to firms via SOLA Trading protocols
- Executed trades were transmitted to CDCC for processing.

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NODAL EXCHANGE/NODAL CLEAR

- Successfully tested via the back up site
- Test orders and test trades were utilized to exercise exchange trading and clearing functionality
- All production products were available for the test
- Web, SFTP and FIX interfaces were available and were successfully tested.

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ONECHICAGO

- Tested the connectivity between customers and OneChicago's DR site beyond basic connectivity testing activities
- Tested end-to-end processing between customers and OneChicago; including connectivity, submitting trades, calculating settlement prices and the dissemination of OneChicago Real-time Market Data (OCTP)
- Scripted trade entry from firms was successfully completed

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OCC

- Tested the ability to conduct critical business functions from alternate/back-up/DR facilities simultaneously
- Tested round trip processing with members and exchanges, including trades, post trades, position finalization, outbound data distribution, and end of day reports
- Worked with each registered participant to develop a test strategy that was tailored to each participant's business model, based on a set of testing guidelines
- Supported SFTP, NDM and MQ file connectivity
- IP addresses and TCP Ports were unchanged, as they were the same as production for this test
- Firms submitted file transmissions and received output test files.

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TRAIANA LIMIT HUB

- Failed over the primary Limit Hub data center in New York to the secondary data center in Chicago
- No action was required by Limit Hub participants, as they connect to both primary and secondary instances via the same IP addresses
- Tested FCM flows, SEF flows, and CCP flows
- Tested FIX heartbeat and MQ ping
- Scenarios addressed during testing included:
  - Switch between Prod and DR sites - Transport Layer
  - Fix – sessions heartbeats
  - MQ – MQ ping, dummy test message
  - Telnet testing
  - UI logins if required

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trueEX

- Tested the DCM and SEF back up platforms
- Test trades were successfully executed on the 2Y
- Test orders were successfully posted/received on the 5Y
- The trueEX support staff acted as the respondent for all trades.

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V. PROBLEMS ENCOUNTERED

- The nature of problems commonly encountered and resolved, fit into the following categories:
  - Access to Back Up Site
  - Application Software
  - Log In
  - Order Entry/Fill Reporting
  - Staffing/Lack of Technical or Domain knowledge
  - System Operations
  - System Software

- Incorrect IP address in firewalls prevented connectivity to the exchange DR site

- MQ session ID and MQ channel connectivity problems; routing was pointed to incorrect queues

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PROBLEMS ENCOUNTERED (Cont'd) …

- Inability to connect to clearinghouse back up site due to incorrect software configuration
- Staffing issues at clearing firms – lack of qualified support staff with access to all the applications being tested
- Some firms did not log in to start testing until just before the end of the testing window. This combined with issues they experienced, required the testing window to be pushed back to accommodate
- Customer internal connectivity problems due to wrong network setup on customer side (wrong IP addresses, wrong network configuration)
- Some members were unable to download reports, though, they were able to view them and upload files
- Dropped connections, as the result of the quality and reliability of internet service provider connection

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PROBLEMS ENCOUNTERED (Cont'd) …

- Specific exchange system had issues with Saturday trade dates, test trades were in a pending status, connectivity was successful
- A firm connected and traded successfully, however they had problems connecting with post trading/allocation services.
- Some registered members did not participate, however, there were some members not registered, who took part in the test
- Firm's tester did not have password for respective username. Resolution was to issue a temporary password reset.
- Testers from a couple of firms were unfamiliar with using the trading GUI and had to be walked through the process of submitting a trade
- DR environment was not cleaned up from a previous simulation test, and contained test orders from that exercise

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PROBLEMS ENCOUNTERED (Cont'd) …

- Large Trader was not accessible and some Large Trader IPs had to be allowed from the firewalls
- Firm connected to test back office systems and market data, but did not test order entry and was not aware that successful test requirements required executions.
- Customer test accounts not recognized by exchange system
- Test accounts not set up properly, thus successful clearing messages could not be tested. Clearing rejects were tested and were successful.
- An internal monitoring tool failed to refresh the post-incident status of some clients

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PROBLEMS ENCOUNTERED (Cont'd) …

- Despite emailed instructions being sent out several times, in addition to conference calls, participants were not prepared on test day or did not understand what was required of them

- Despite channel connection being tested and working pre-open, there was a problem with acknowledgement of test trades being sent over. Trades were resent and they were manually processed.

- Internal issue did not prohibit outside users/firms from logging into the application, but did prohibit trading with them. Once an update was made on the vendor's side, were able to successfully log in and place trades with firms looking to test

- Some members did not provide sufficient evidence/proof of testing and completion when done

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VI. LESSONS LEARNED

- The industry proved that it is capable of successfully orchestrating an industry-wide disaster recovery test, including test management, process recovery and order entry from alternate work recovery sites
- Staffing skill issues impeded the test progress at some firms (did not have front end or back end expertise)
- Under real life situations, most problems could probably be resolved within hours or by/before the start of the next business day.
- At a given firm, multiple departments in different geographic locations can have various testing responsibilities. It can be difficult to get these areas on the same page without a strong BCP coordinator in place.

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LESSONS LEARNED (CONT'D)…

- Must ensure that contact list is properly updated, including pre-test and test day
- Participants need to understand the time and resource commitment required to simulate trading, clearance and settlement.
- Most problems that were encountered were rectified quickly, although some caused an unexpected delay to the test start/progress
- Ensure that members have front-office staff to conduct trades needed for back-office staff to complete

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LESSONS LEARNED (CONT'D)…

- On test day, must ensure that members give updates on a regular basis
- The conference bridge is a great tool for contacting firms that may not be answering the phones in their operations centers during the test.
- Must solidify support teams to ensure prompt issue resolution
- Exchanges need more frequent, one-on-one dialogue and written communications with their clearing members for future exercises.
- Set test staff up with a dummy trading account that will be allowed to clear on the DR test day, so that test staff can complete trades of testers who are in self-trade prevention groups and cannot hit their own bids

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LESSONS LEARNED (CONT'D)…

- Must clarify certain items in our script and ensure script has latest information

- The failover process, and addressing and remediating issues, is well rehearsed and practiced. There are quarterly fail overs to the passive site and it operates there for a full week, before failing back. Thus, clients can be assured DR operates as expected and can always be aligned to the primary site.

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LESSONS LEARNED (CONT'D)…

- Per specific Exchange guideline, emphasis in communication to clients (via conference calls and test scripts) that an execution is a mandatory part of the DR exercise
- Participants continue to indicate that the test helps them to:
  - Test connectivity and recovery to/from DR sites
  - Test the effectiveness of staff's business continuance capabilities working from alternate work sites
  - Identify/refine pre-test and post-test procedures for connectivity testing
  - Tighten up and document their business continuity and system fail over procedures
  - Improve test scripts and plans for future tests (Exchanges)
  - Identify internal single points of failure
  - Better understand where cross-training is needed

LESSONS LEARNED (CONT'D)…

- Firms must continue to be prepared for changes or impact to their networks caused by demand of test requirements:
  - Highlight environmental impact or expectations on the firms networks, IP address changes, firewalls etc.
  - Be aware of any impacts and make changes accordingly to accommodate testing
  - Have proper network staffing and key service providers' support actively engaged before and during the test
  - Participate in pre-test communications testing to shake down any issues or problems.

VII. SUGGESTED NEXT STEPS

- Find ways to improve communications to/from exchanges, clearinghouses, SEFs and key service providers, leading up to and on the test day
- Consider keeping the testing and trading windows open at least 30 minutes longer than the published times to accommodate stragglers and those with issues.
- Develop a process whereby the exchanges acknowledge back to each firm that they are registered for the test
- Keep more emphasis on the order entry phase, not just connectivity
- Pre-test communications testing should be mandatory for all clearing firms to ensure that potential connectivity issues are resolved prior to test day

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SUGGESTED NEXT STEPS CONT'D)…

- After test completion, firms should provide screen shots to exchanges as evidence of test success
- Consider having the exchanges and clearinghouses expand their test windows for order entry/clearing, to assuage the impact of test delays when migrating from one part of the test to the other
- Further engage Exchange memberships to encourage participation in the DR Test
- Evaluate the potential of having two DR Tests within a calendar year (versus one test)
- Evaluate the potential of moving the DR Test from October to the Spring (April?)

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SUGGESTED NEXT STEPS CONT'D)…

- Encourage more business continuance with key staff testing from alternate work sites
- Engage more Swap Execution Facilities, Swap Data Repositories and service providers such as DTCC, LCH and Markit for next year's test
- Ensure that test accounts are properly set up, prior to test day
- DR administrators must communicate test expectations to front-line employees familiar with daily processes
- Firms must confirm that any ISVs utilized in production support their testing on test day and confirm that their systems are correctly pointed to DR
- Have the FIA highlight changes that are made in the UPDATE registration emails

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SUGGESTED NEXT STEPS CONT'D)...

- Continue to push firms to register directly for the test via the FIA web portal, and not assume their ISV will do it for them, etc.
- Exchanges and clearinghouses that make IP address changes as part of their test scope should provide at least a 30 day notice to test participants, to allow for internal lead time requirements for firewall rule change requests.
- Increase DR Test campaign initiatives, and schedule more all hands-on calls prior to test day.
- Evaluate the potential of having a persistent chatroom as a complement to the conference bridge on test day
- Offer improved dial-in options for participants outside the U.S., as well as, survey whether 3:00pm ET (2:00pm CT) is still a good time of day for conference calls

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SUGGESTED NEXT STEPS CONT'D)…

- Evaluate potential change to frequency of webinars, which are currently held twice a year in June and September
- Evaluate potential changes to the Registration form to make sure that essential/helpful information is being captured.
- Evaluate potential ways for Exchange test scripts to be more standardized, while respecting the differences per Exchange
- Exchanges can advise if they conduct other yearly exercises, or provide additional opportunities for Firms to test

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SUGGESTED NEXT STEPS CONT'D)…

- Query firms to determine potential expansion of FIA Test to other futures Exchange/Clearinghouse/SEF participants, not currently participating

- Clean up the FIA DR Test distribution list in Q1 2018, to ensure proper contacts are receiving pertinent information

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Thank you for your feedback!

We will distribute a **SurveyMonkey**, in the coming weeks, to engage you on the many topics mentioned within the final report.

Please submit additional feedback/questions to Steve Proctor at **sproctor@fia.org**

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