

FUTURES INDUSTRY ASSOCIATION CONTINUITY OF BUSINESS OPERATIONS

2016 EXERCISE RESULTS

“DR XIII”

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I. BACKGROUND

- The FIA Market Technology Division successfully conducted its thirteenth (13th) annual continuity of business and disaster resilience test in October 2016.
- Starting in Q1 2016, the FIA Business Continuity Management committee began detailed preparations for this year's annual industry-wide test.
- A working group was convened to discuss and agree on a date, goals, objectives, etc.

BACKGROUND (Cont'd) ...

- Regular committee conference calls were held between May and October (bi-weekly and weekly).
- Two futures Industry BC/DR symposiums were held in June and September via WebEx/conference calls.
- Major participating exchanges and clearinghouses included:

BGC Derivatives Markets	ICE Clear Europe
BME Clearing	ICE Clear Credit
Canadian Derivatives Clearing Corp.	ICE Futures Singapore
CBOE Futures Exchange	ICE Clear Singapore
CME Group	LCH Clearnet
CME Clearing	Mercado Espanol Futuros Financieros
CME SEF	Bourse de Montreal / TMX Group
Dubai Mercantile Exchange	Minneapolis Grain Exchange
Eris Exchange	Nodal Exchange
Eurex	Nodal Clear
ICE Futures US	OneChicago
ICE Clear US	OCC
ICE Futures Canada	Traiana
ICE Clear Canada	TrueEx
ICE Futures Europe	TrueEx SEF
ICE Futures Europe	

BACKGROUND (CONT'D) ...

- The scope of this year's initiative was designed to test business continuance, process recovery and disaster resilience connectivity and functionality between exchanges, clearinghouses and member firms:
 - Verify firms' ability to test their business continuance (i.e., the people side) from alternate work recovery sites
 - Test firm back-up to exchanges and clearinghouses back-up sites (DR-DR)
 - Verify connectivity and process recovery
 - Test round-trip communications capabilities
- The WebEx sessions were well attended by operations managers and business continuance representatives from various clearing and non-clearing firms

BACKGROUND (Cont'd) ...

- The committee including representatives from:
 - Clearinghouses
 - Exchanges
 - Swap Execution Facilities (SEFs)
 - Futures Commission Merchants (FCMs)
 - Clearing firms
 - Non-Clearing firms
 - Key service providers
 - Independent software vendors (ISVs)

II. EXECUTIVE SUMMARY

- The thirteenth annual industry-wide continuity of business and disaster resilience test in the U.S. financial services sector was highly successful, largely in part to the excellent working relationship between exchanges and the firms.
- Major U.S. and international futures exchanges, swap execution facilities, clearinghouses, FCMs and clearing firms participated in this year's test:
 - 62 FCMs, clearing firms and non-clearing firms participated
 - Between 74% -100% of firms tested successfully, depending on the exchange

EXECUTIVE SUMMARY (CONT'D) ...

- This year's test initiative was expanded to include additional participants: derivatives exchanges, clearinghouses and credit hubs:
 - Eurex
 - Nodal Exchange
 - Nodal Clear
- The exchanges and clearinghouses demonstrated that their systems, processes and procedures simultaneously worked very well, communicating from back up systems/sites.

EXECUTIVE SUMMARY (CONT'D) ...

- As in prior years, more firms and exchanges tested the “people side” of their business continuance capabilities, as well as the disaster resilience and recovery of their systems infrastructure
- 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, and some firms had test staff working remotely from home
- Firms tested from alternate personnel sites located in California, Colorado, Connecticut, Delaware, Florida, Illinois, Missouri, New Jersey, New York, North Carolina, Texas, Utah and Virginia, as well as Barcelona, Dubai, Frankfurt, London, Madrid, Mississauga, Montreal, Ontario, Paris, Toronto and Winnipeg.

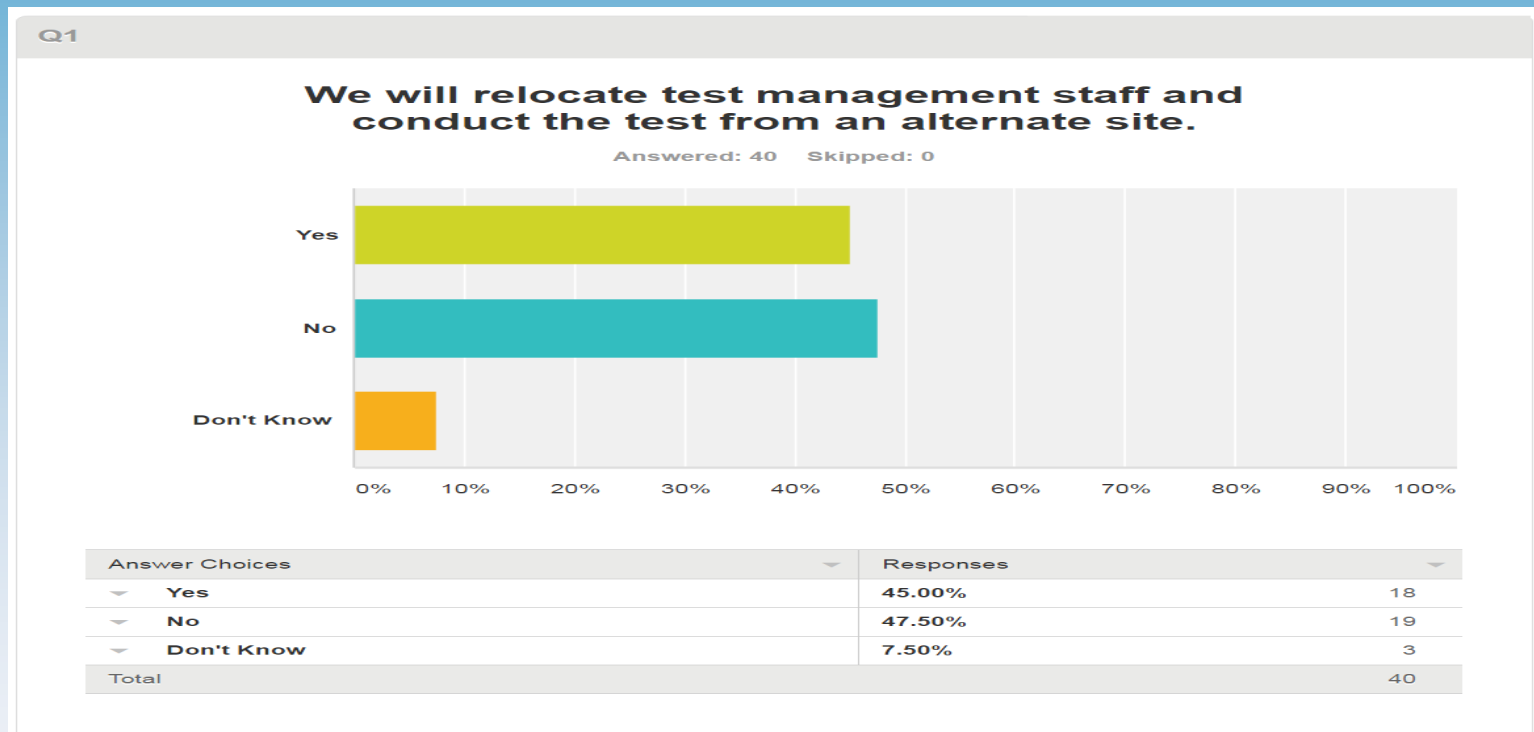
EXECUTIVE SUMMARY (CONT'D) ...

- Firms indicated that the test helped 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
- Several exchanges reported that some firms pre-registered for the test but did not participate; likewise, some firms did not pre-register but “showed up” and tested.

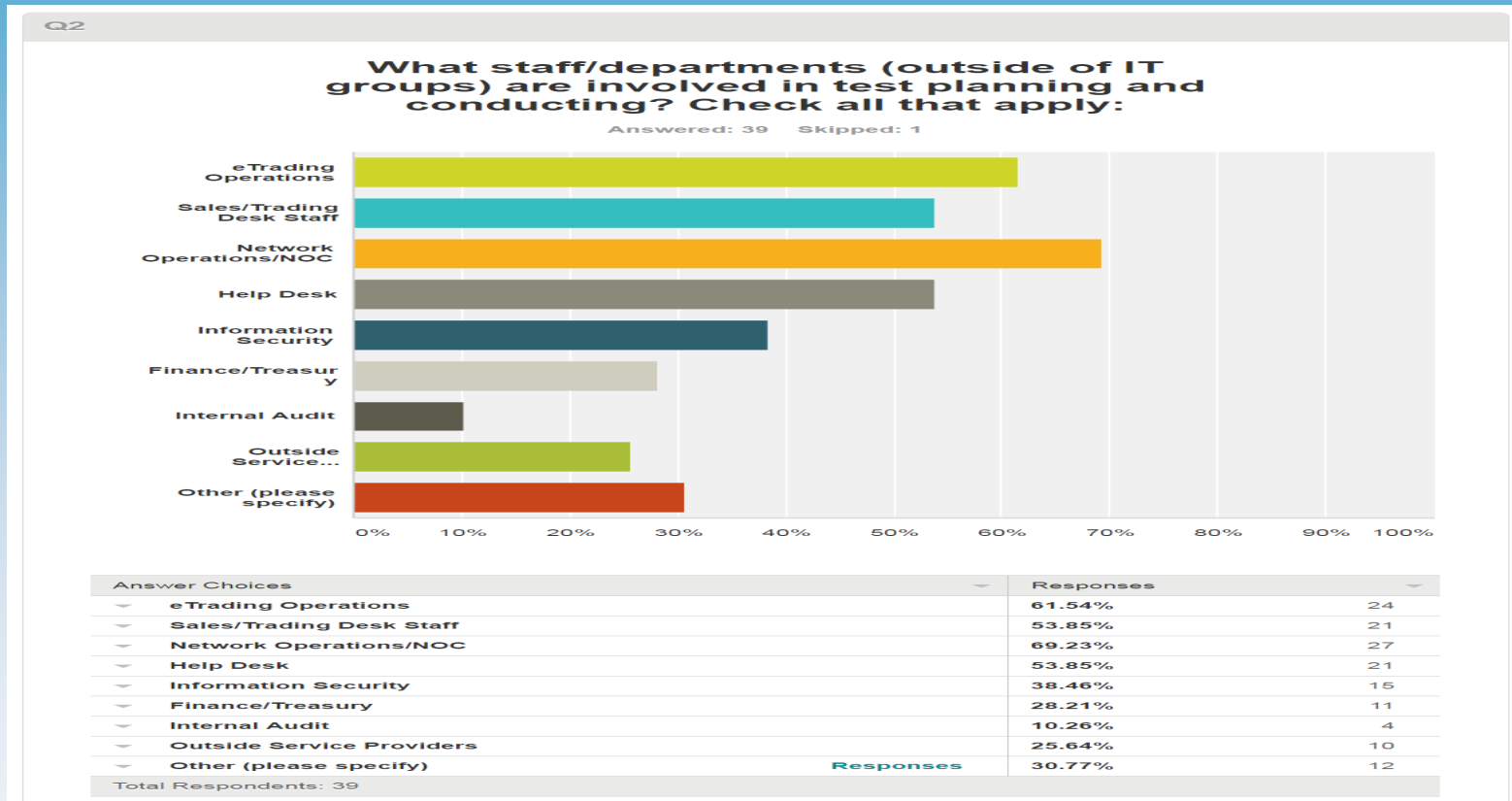
III. CONTINUITY OF OPERATIONS

- A survey was taken to assess the scope of additional business continuance activities the participants conducted in conjunction with the exercise
- These included:
 - 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
- Respondents indicated that multiple departments are involved with the planning and execution of the test

ALMOST HALF OF PARTICIPANTS RELOCATED STAFF AND TESTED FROM ALTERNATE SITES



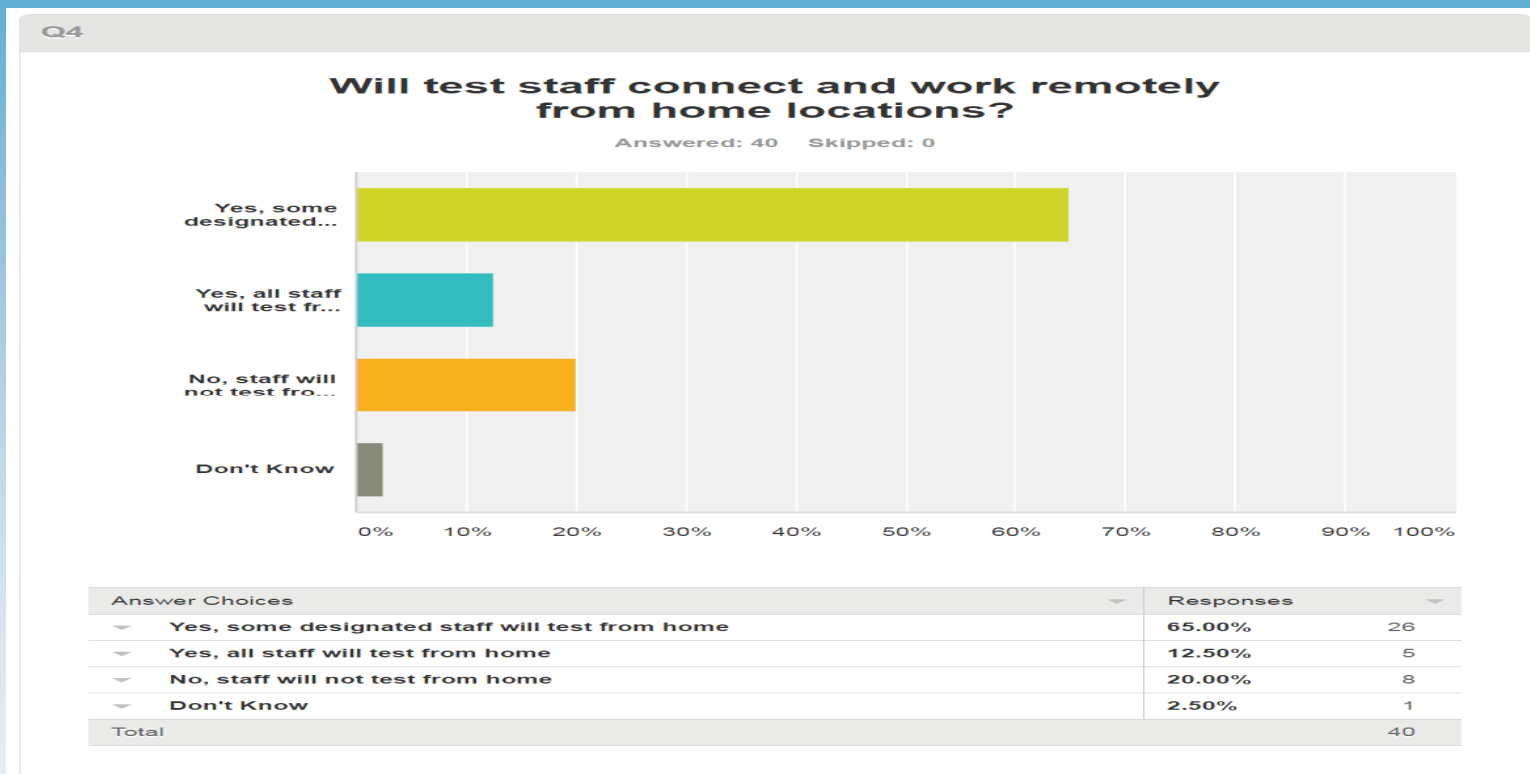
A CROSS-SECTION OF DEPTS. ARE INVOLVED IN PLANNING / EXECUTION



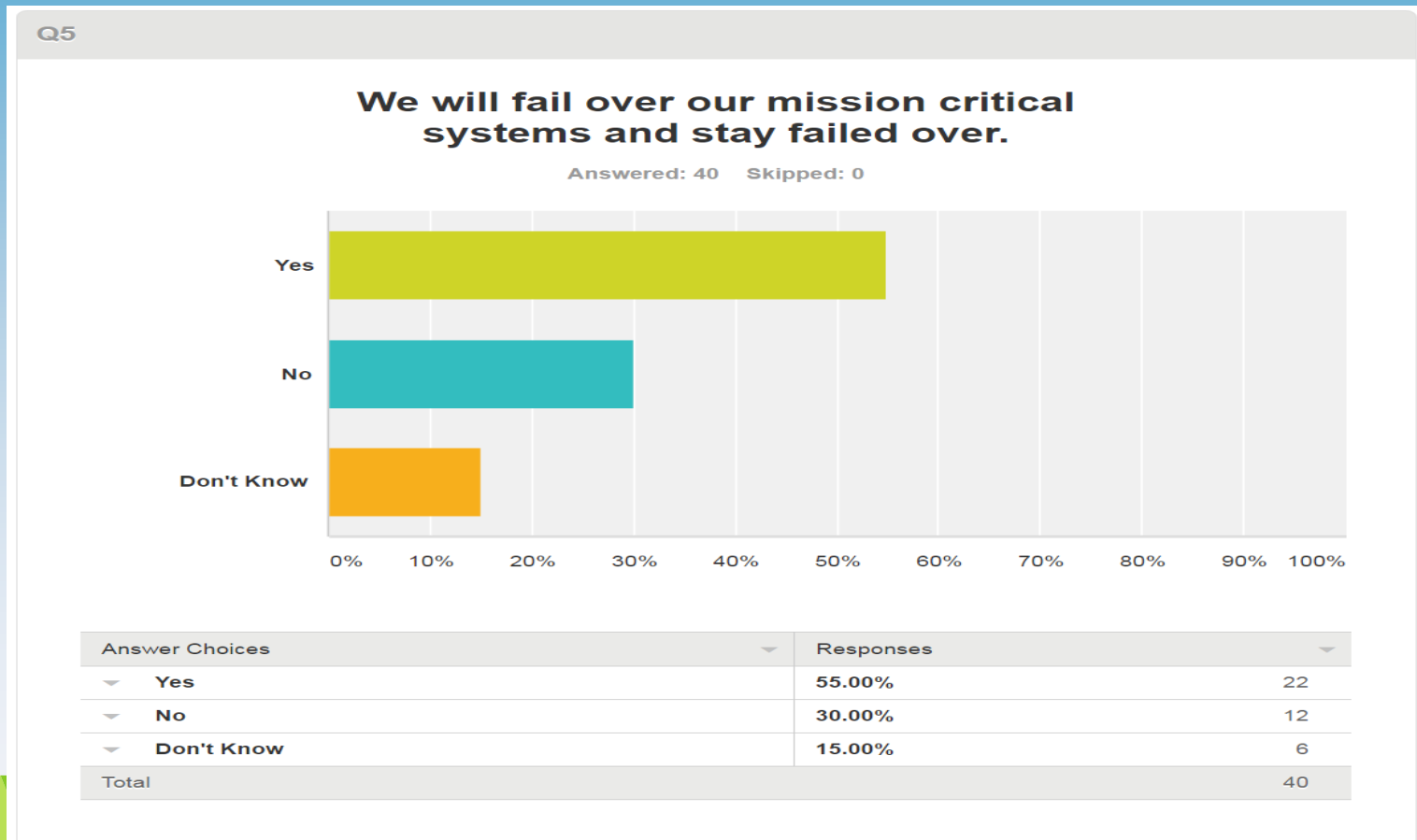
ALTERNATE WORK SITES ARE GEOGRAPHICALLY DISBURSED

- **U.S. States and Canadian Provinces:**
 - California, Connecticut, Colorado, Delaware, Florida, Illinois, Missouri, New Jersey, New York, North Carolina, Texas, Utah and Virginia.
 - Manitoba, Ontario, Quebec
- **International Cities:**
 - Barcelona, Dubai, Frankfurt, London, Madrid, Paris

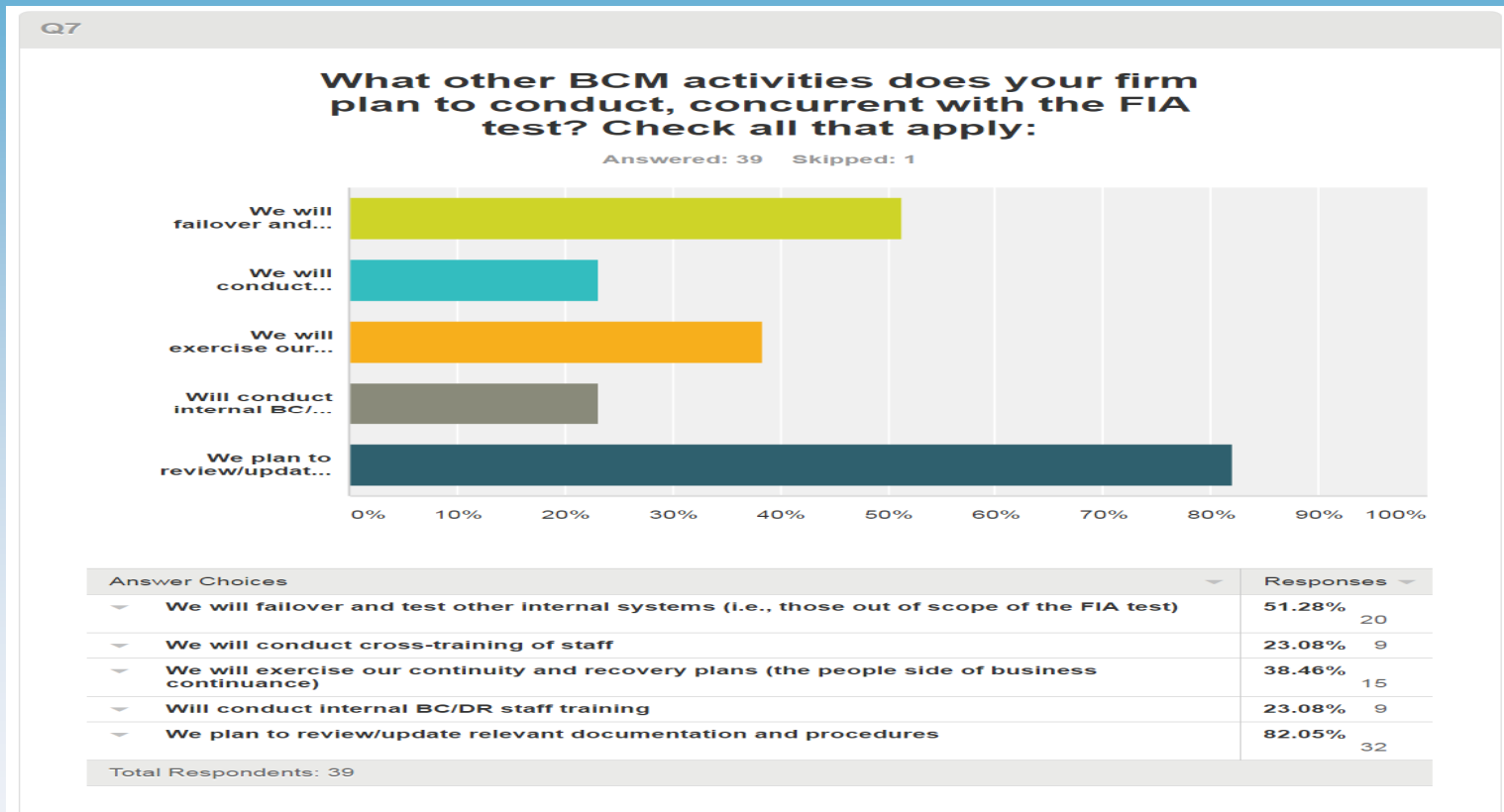
A MAJORITY CONNECTED, WORKED REMOTELY, SOME FROM HOME



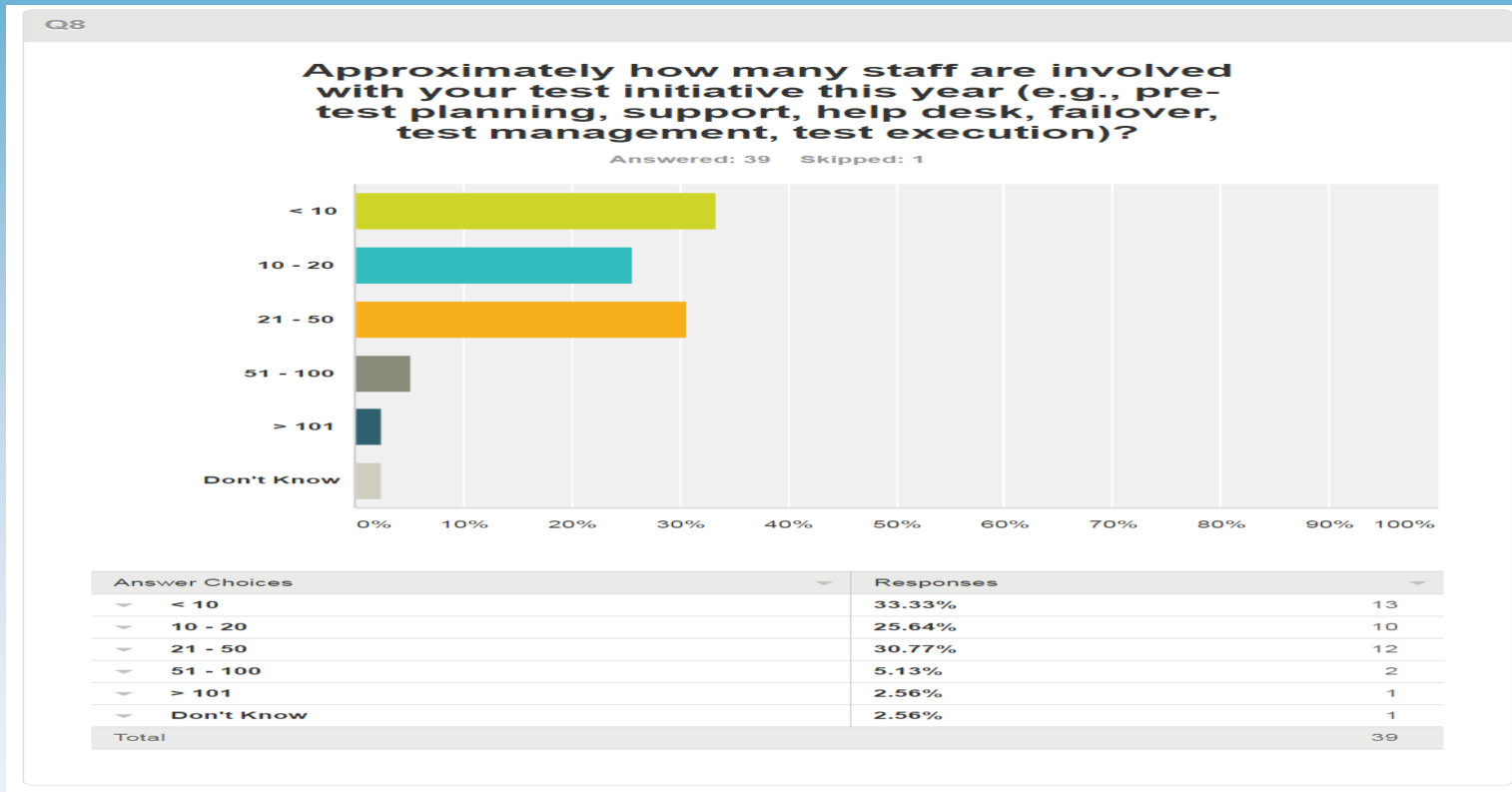
MORE THAN HALF OF ENTITIES REMAINED FAILED-OVER AFTER THE TEST



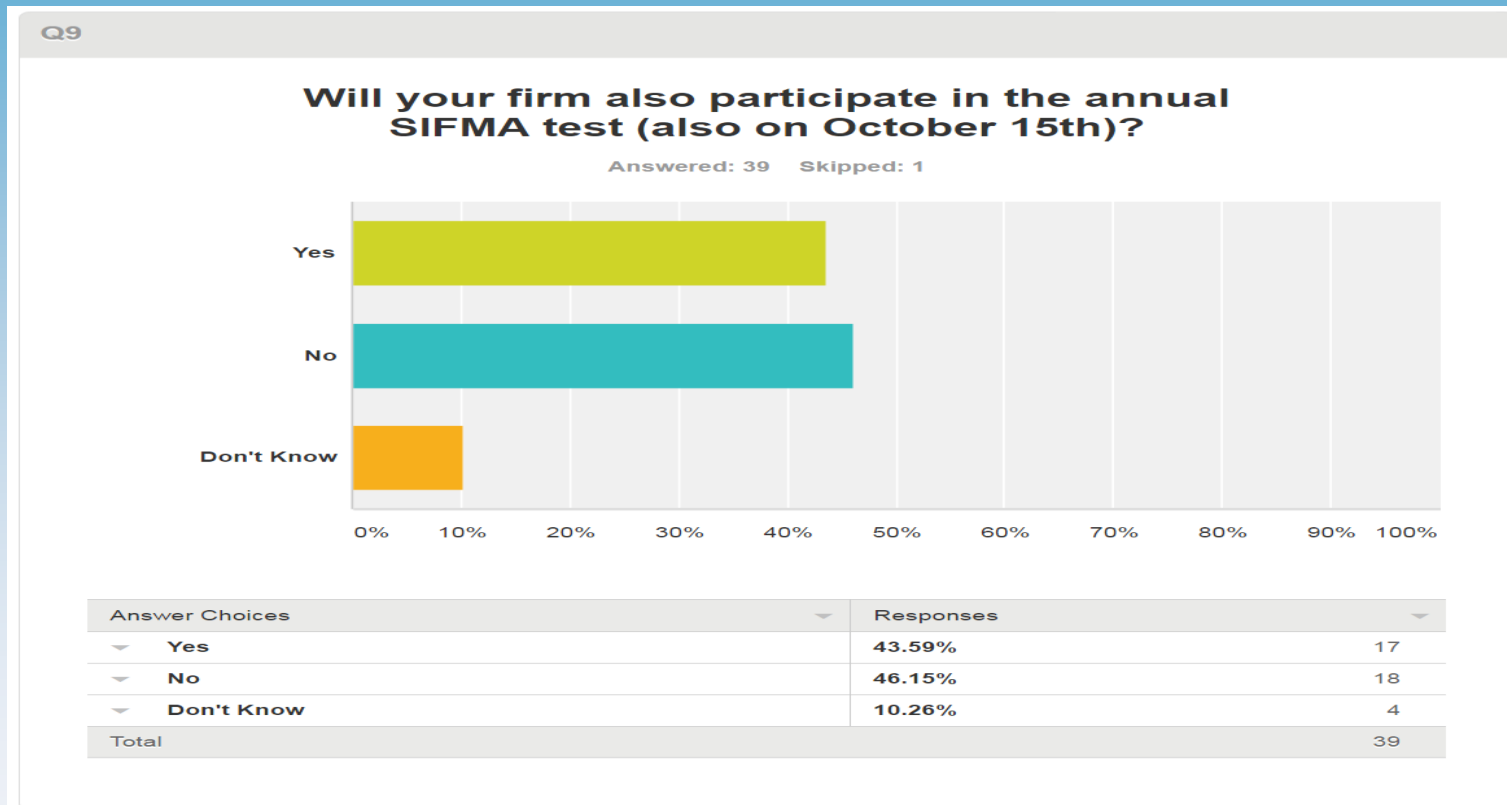
THE TEST WAS USED TO CONDUCT, REFINE OTHER BUSINESS RESILIENCE ACTIVITIES



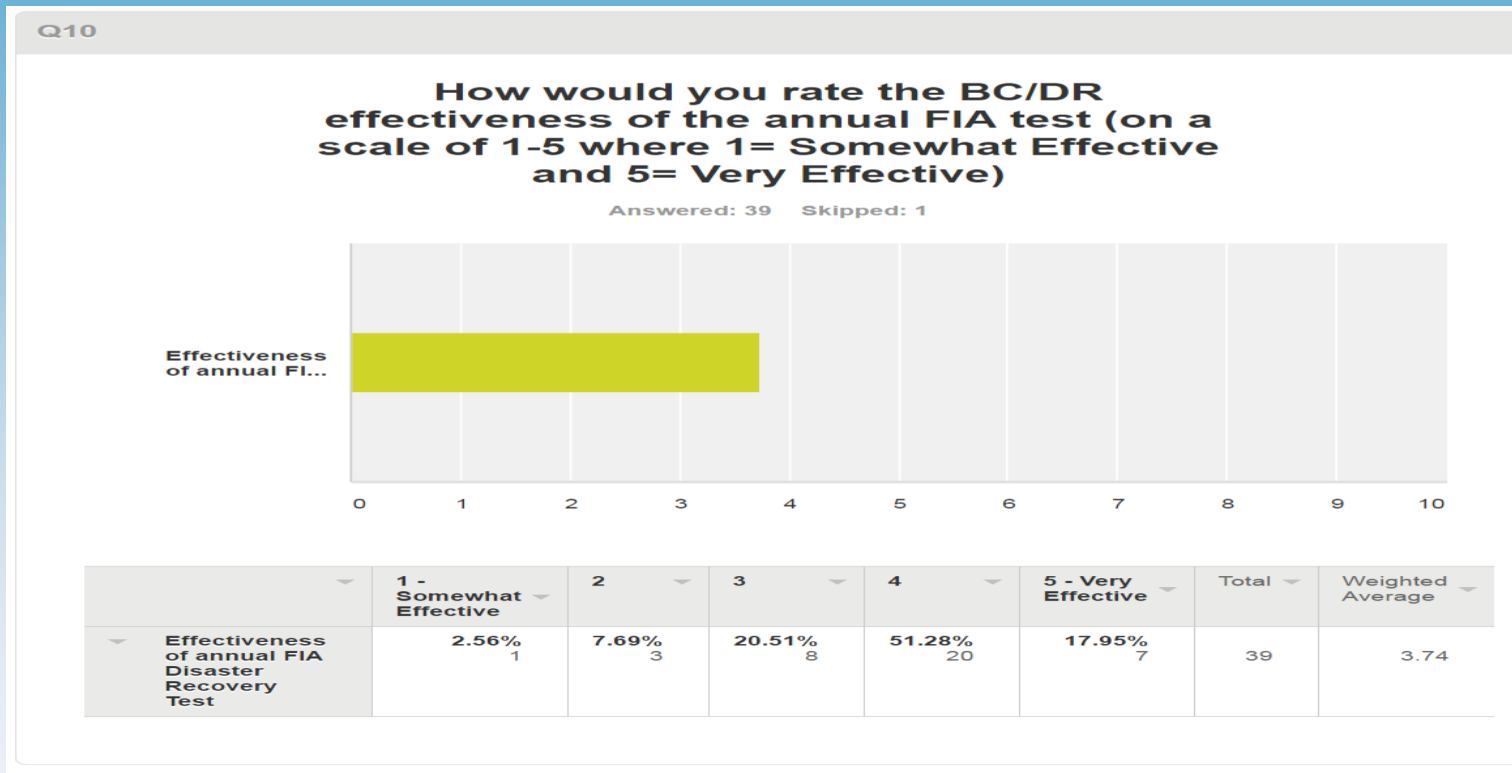
DOZENS OF STAFF ARE INVOLVED IN TEST PLANNING AND EXECUTION



ALMOST HALF OF FIRMS CONCURRENTLY PARTICIPATED IN THE SIFMA INDUSTRY TEST



THE EXERCISE WAS RATED AS HIGHLY EFFECTIVE BY A MAJORITY OF PARTICIPANTS



IV. OVERALL TEST RESULTS

- 31 domestic and international futures exchanges, clearinghouses, swap execution facilities and 62 clearing/non-clearing firms* participated in the test
- Test participants included clearing firms, non-clearing firms and trading participants
- On average, between 38% and 92% of all futures clearing firms participated
- Participant firms represent a significant critical mass of derivatives order flow and liquidity at the major exchanges:
 - 50% - 93% of exchanges' volume.

OVERALL TEST RESULTS (Cont'd)...

- The National Futures Association successfully received regulatory file uploads from two exchanges 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:
 - Broadridge Financial
 - CQG
 - Fidessa
 - FIS Global
 - ION Trading
 - Trading Technologies



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.

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.

CBOE FUTURES EXCHANGE

- Tested via member firms' back up connectivity to back up CBOE Command back up 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.

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 CME Jackson Direct, GLink and LNET); other scenarios 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 FTP.

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
- Uploaded regulatory data file to NFA's back up site
- Firms successfully tested file and data transfer from the backup site.

EUREX

- Tested an outage scenario that reflected the loss of the primary data center, taking the production T7 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
 - Connectivity to FIX gateways

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.

ICE EXCHANGES

- Tested member firms' back-up connectivity to the ICE Exchange electronic trading system DR site
- Scripted order entry for Canola, Russell 2000, Sugar 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.

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.

ICE CLEAR CREDIT

- Tested member firms' back-up connectivity to the ICE Clear Credit DR site
- Members accessed the Web Report Distribution, Managed File Transfer Download and Upload systems
- Printing of test reports were achieved via Web Report Distribution
- Data files were downloaded and retrieved via SFTP.

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.

LCH CLEARNET

- The test scenario simulated an outage the London primary data center
- Swap Clear LTD and MemberWeb system access operated via the backup data center (CDC)
- All customers were able to connect to the backup data center without any changes to their systems as cutover was seamless using the same IP Addresses and access methods.

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.

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
- TRES 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.

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.

NATIONAL FUTURES ASSOCIATION

- Successfully failed over production servers to the hot site back up systems
- Tested real time Trade Position Monitoring System (TPMS) from back up hot site
- Successfully received data file uploads from CBOE Futures Exchange and Eris Exchange via SFTP.

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.

ONECHICAGO

- Tested the OCX Delta1 ETS via the back up site
- Scripted trade entry from firms was successfully completed for AAPL1D futures on CBOEDirect and OCXdelta1.

OCC

- Tested back up systems from the back up site
- Supported SFTP, NDM and MQ file connectivity
- IP addresses and TCP Ports were unchanged, as they were the same as production for this test
- Trade entry was conducted via usual client with the alternative hosts
- Products traded included:
 1. AAPL1D (or XLF1D) November SSF
 2. AAPL1D (or XLF1D) Nov/Dec SSF Spread
 3. AAPL1D (or XLF1D) Nov Bilateral Block
 4. AAPL1D (or XLF1D) Nov Bilateral EFP
- Firms submitted file transmissions and received output test files.

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 and SEF flows
- Tested FIX heartbeat and MQ ping
- Users scenarios addressed testing:
 - Switching between Production and DR sites - Transport Layer (FIX, MQ, Others)
 - FCM limits reception
 - Pre-Trade Limit Check
 - CCP Take Up
 - Bunched Order Allocation

TRUE EX

- 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.

V. PROBLEMS ENCOUNTERED

- A number of firm problems were encountered; most were resolved quickly, although some caused an unexpected delay to test start/progress
- Common problems that were encountered and resolved included:
 - 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
 - Citrix configuration and password issues
 - Inability to connect to clearinghouse back up site due to incorrect software configuration

PROBLEMS ENCOUNTERED (Cont'd) ...

- Firms were unable to connect to the exchange DR site, as their trading system ISV did not activate access that day
- Staffing issues at clearing firms – lack of qualified support staff with access to all the applications being tested
- Some firms connected to the exchange DR site and experienced internal issues with GUI connectivity; they ran out of time and the problem was not resolved
- Some firms needed to be reminded of their IP addresses and credentials for DR versus production
- Issues with an ISV prevented the completion of the trade entry portion of the test script by some firms
- Some firms' DR administrators did not communicate expectations of the daily process with the exchange (processing windows) to their front line staff.

PROBLEMS ENCOUNTERED (Cont'd) ...

- Inability to generate orders/trades due to front end connectivity issues
- Some firms only completed part of the test script, due to lack of qualified support staff with access to all the applications being tested
- Some firms experienced trade rejections due to use of incorrect test accounts.
- One firm had pre-registered and cancelled at the last minute due to a re-scheduling of internal IT resource priorities.

PROBLEMS ENCOUNTERED (Cont'd) ...

- Although early one-on-one coordination meetings to walk through the intent of the test and scope were held, several firms were still unclear as to the testing expectations during the week leading in to the test.
- Coordination within certain firms that have a national or global presence proved to be very challenging. 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.

VI. LESSONS LEARNED

- The futures industry proved that it is capable of successfully orchestrating an industry-wide business continuance, disaster recovery test, including test management, process recovery and order entry from alternate work recovery sites
- Most problems that were encountered were rectified quickly, although some caused an unexpected delay to the test start/progress
- 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.

LESSONS LEARNED (CONT'D)...

- The exchanges and clearinghouses' internal support processes and procedures worked well; they indicated that the test helped them:
 - 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
 - Identify some internal single points of failure
 - Better understand the need for cross-training.

LESSONS LEARNED (CONT'D)...

- Firms must be prepared for any changes or impact to their networks caused by the test requirements:
 - Highlight any 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.

LESSONS LEARNED (CONT'D)...

- Exchanges need more frequent, one-on-one dialogue and written communications with their clearing members for future exercise.
- Participants need to understand the time and resource commitment required to simulate trading, clearance and settlement.

VII. SUGGESTED NEXT STEPS

- Continue to improve communications to/from exchanges, clearinghouses, SEFs and key service providers, leading up to and on the test day
- Develop a process whereby the exchanges acknowledge back to each firm that they have them registered for the test (the week of the test)
- Place more emphasis on the order entry phase, not just connectivity...
- Pre-test communications testing should be mandatory for all clearing firms to ensure any connectivity issues are resolved prior to test day
- Test registration must include firms' key IT and operations contacts for pre-test and on test day.

SUGGESTED NEXT STEPS CONT'D)...

- After test completion, firms should provide screen shots to exchanges as evidence of test success
- Mandate that test script/test plan distribution from the exchanges be available at least 2 months prior to the test date.
- 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
- 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.

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 in next year's test
- Ensure that test accounts are properly set up, prior to test day
- DR administrators must communicate test expectations to those 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

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
- More strictly enforce participation in pre-test connectivity testing; this is a critical success factor
- It is imperative that all DR sites and systems be tested and confirmed as operational at least annually.