

FUTURES INDUSTRY BUSINESS CONTINUITY AND DISASTER RECOVERY

2014 INDUSTRY TEST RESULTS

“DR XI”

November 2014

Compiled and Developed by

Tellefsen and Company, L.L.C.



TABLE OF CONTENTS

	<i>Page Number:</i>
I. Background	3
II. Executive Summary	7
III. Overall Test Results	11
IV. Problems Encountered	33
V. Lessons Learned	40
VI. Suggested Next Steps	44

I. BACKGROUND

- The FIA Market Technology Division successfully conducted its eleventh (11th) annual disaster recovery test in October 2014.
- Starting in Q1, 2014, 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 August via WebEx/conference calls.
- Symposium presenters included representatives from the major exchanges and clearinghouses:

BGC Derivatives Markets	ICE Clear Credit
Canadian Derivatives Clearing Corp.	ICE Clear Canada
CBOE Futures Exchange	LCH Clearnet
CME Clearing	Javelin SEF
CME Group	Mercado Espanol Futuros Financieros
CME SEF	Montreal Exchange
ELX Futures	Minneapolis Grain Exchange
Eris Exchange	OneChicago
GFI Creditmatch SEF	OCC
ICE Exchanges	TP SEF
ICE Clear US	TrueEx
ICE Clear Europe	TrueEx SEF

BACKGROUND (CONT'D) ...

- The scope of this year's initiative was designed to test DR back-up connectivity and functionality between exchanges, clearinghouses and member firms:
 - Test firm back-up to exchange back-up sites (DR-DR)
 - Verify connectivity
 - Test round-trip communications capabilities
 - Verify firms' ability to test their business continuance (i.e., the people side) from alternate work recovery sites
- The WebEx sessions were well attended by numerous operations managers and BC/DR 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 eleventh annual industry-wide disaster recovery test in the U.S. financial services sector was highly successful, largely in part to the good 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 77% -100% of firms tested successfully, depending on the exchange

EXECUTIVE SUMMARY (CONT'D) ...

- This year's test initiative was expanded to include swap execution facilities:
 - BGC Derivatives Markets SEF
 - GFI CreditMatch
 - Javelin SEF
 - TP SEF
 - TrueEx SEF
- 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) ...

- This year, more firms and exchanges tested the “people side” of their business continuance, as well as the disaster 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 test participants
- Some firms’ alternate site work strategies included working remotely from home
- Firms tested from alternate personnel sites located in California, Colorado, Florida, Illinois, Missouri, New Jersey, New York, North Carolina, Texas and Utah, as well as Frankfurt, London, Madrid, Montreal, Paris, Toronto and Winnipeg.

EXECUTIVE SUMMARY (CONT'D) ...

- Firms indicated that the test helped them:
 - Exercise their business continuity/disaster recovery 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/clearing house 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. OVERALL TEST RESULTS

- 24 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, ~85% of all futures clearing firms participated
- Participant firms represent a significant critical mass of futures order flow and liquidity at the major exchanges:
 - 63% - 100% of futures exchanges' volume.

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
- Test participants confirmed connectivity after failover from production to the backup site.

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
- Transmitted trades to/from the OCC's back up systems via MQ and SFTP
- Transmitted regulatory data to NFA 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, generated 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.

ELX FUTURES

- Tested via eSpeed electronic trading system
- Trading products included all ELX UST and Eurodollar futures contracts via eSpeed supported API's
- Block trades or EFP trade types were not accepted
- End of day files were produced by OCC.

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
- Firms successfully tested file and data transfer from the backup site.

GFI CREDITMATCH

- Tested failing over from primary site to secondary sit
- Included customer connectivity, and third party post-trade processing systems
- Verified connectivity and trade input via Radianz and the public Internet.

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 Managed File Transfer (MFT) system and tested the following:
 - File Download
 - *E.g. Clearing Eligible Trade File, Final Clearing Instruction File*
 - File upload
 - *E.g. Clearing Eligible Trade File*

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.

JAVELIN SEF

- Javelin switched over and tested from its DR facility
- Customers connected and sent in orders
- Javelin transmitted test trades to its firms
- Both Javelin and firms could see each other's orders
- Some firms failed over from their primary to their DR sites.

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

- Tested via the MEFF production SMART ETS environment
- Simulated a failure of the Madrid Las Rozas main data center, including collocated member's appliances
- Members entered trades and received reports
- Transfer files were delivered from clearing
- 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
- 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.

MONTREAL EXCHANGE/TMX GROUP

- Tested the SOLA® Trading electronic system via the Toronto back up site
- MX provided automated market volume for bids/offers on selected instruments
- Trades were transmitted to firms via SOLA Trading protocols (HSVF and ATR)
- Executed trades were transmitted to CDCC for processing.

ONECHICAGO

- Tested CBOEdirect 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
- Firms submitted file transmissions and received output test files.

tpSEF INC.

- Confirmed customer connectivity to the tpSEF Disaster Recovery facility
- Confirmed successful customer API connectivity to the tpSEF Disaster Recovery facility
- Tested and confirmed customer end to end transaction and market data to the tpSEF disaster recovery trading environment for Medium Term Swaps.

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.

IV. 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
 - Citrix configuration issues
 - Inability to connect to clearing house back up site due to incorrect software configuration

EXCHANGE/CLEARING HOUSE PROBLEMS ENCOUNTERED

- An exchange encountered network problems causing a 2.5 hour delay for their customers and partner exchanges
- Most of their clearing firms were able to retrieve files, send reports and validate MQ connectivity, as well as confirm access to the CH portal and enter a block trade
- However, due to the issues encountered on the front end trade entry side to submit trades, firms were not able to complete the trade flow from front to back
- Towards the end of the test the exchange staff injected orders for customers in order to generate trade reports.

EXCHANGE/CLEARING HOUSE PROBLEMS ENCOUNTERED (Cont'd)

- The exchange conducted a post-mortem to determine the root cause of the problem. Issues were identified and internal testing is being conducted to validate the solution
- They will be announcing an additional customer test in the Spring of 2015.

EXCHANGE/CLEARING HOUSE PROBLEMS ENCOUNTERED (Cont'd)

- A European clearing house encountered sporadic member firm login problems and LDAP replication within its key clearing applications, causing a delay to their start of the test
- As a result, they had to manually change and re-assign clearing members' passwords. This enabled the progress and completion of the test
- Another exchange had sporadic problems with its market data replay capabilities; this was subsequently resolved and allowed the test to progress.

FIRM PROBLEMS ENCOUNTERED

- Inability to generate orders/trades due to front end connectivity issues
- IP addresses incorrectly pointing to DR site
- Inability to upload LOPR positions from exchange limit reporting application
- Inability to connect to the exchange's Citrix backup IP and port addresses due to an incorrect Citrix client configuration
- Inability to connect to the DR site by a key service provider
- Firms that were not pre-registered could not be quickly enabled to test, due to the lead time required to configure/start up their gateways.

FIRM PROBLEMS ENCOUNTERED (Cont'd)

- Some firms only completed part of the test script, due to lack of qualified support staff with access to all the applications being tested
- MQ connectivity and session issues due to system misconfigurations
- Inability to access/upload clearing reports

FIRM PROBLEMS ENCOUNTERED (CONT'D)...

- Firms with primary systems co-located in the exchange's data center were impacted when the exchange failed over to their DR data center; they also failed over
- Member firm(s) was unable to submit orders and could not resolve the problem before the test window closed
- Lack of domain or technical knowledge on test day impeded firms' and exchanges' problem solving capabilities.
- Some firms pre-registered and cancelled at the last minute due to a re-scheduling of internal IT resource priorities.

V. LESSONS LEARNED

- The futures industry proved that it is capable of successfully orchestrating an industry-wide disaster recovery test, including test management 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 skills 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 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 should review and ensure that all open (GTC) orders are cancelled from the DR environment, prior to failing over to DR
- Exchanges should investigate more efficient methods to facilitate seamless failover from primary to back up, and/or faster activation of MQ channels (e.g., logical domain names vs. static IP addresses, use of more automated network tools etc.).

VI. SUGGESTED NEXT STEPS

- Continue to improve communications to/from exchanges, clearing houses, SEFs and key service providers, leading up to and on the test day
- Pre-test communications testing should be mandatory for all clearing firms to ensure any MQ or connectivity issues are resolved prior to test day
- Firms must confirm that any ISVs utilized in production support their testing on test day and confirm that their systems are correctly point to DR
- 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, clearing firms should provide screen shots to exchanges as evidence of test success
- Exchanges should send their test plans/scripts in MS/Word format, to enable test participants to easily cut and paste into their test day run books
- Continue to push for a common test plan look and feel
- Consider having the exchanges' 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.

SUGGESTED NEXT STEPS CONT'D)...

- Exchanges 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
- Exchanges should specify a handful of products that are available for order entry/trading, to facilitate firms' pre-test set up work
- It is imperative that all DR sites and systems be tested and confirmed as operational at least annually.

SUGGESTED NEXT STEPS CONT'D)...

- Encourage more business continuance with key staff testing from alternate work sites
- Encourage exchanges/SEFs to provide as much full “round trip” testing as possible (i.e., trading through clearing outputs)
- Include more Swap Execution Facilities and Swap Data Repositories in next year’s test (e.g., DTCC, LCH, MarkitServ)
- 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
- Continue to coordinate the 2015 test (Saturday October 24, 2015) with SIFMA, as there are member firms that are joint FIA/SIFMA members.