Integrated Trading and Clearing (ITaC) Working Group Session

21 September 2015

Agenda

- ITaC User Readiness Timeline and Diagrams
- Pre Trade Risk Management
- Post Trade Risk Monitoring
- Short break
- Post Trade Risk Management
  - Margining
    - Methodology
    - Approach
    - Margin requirements
    - J-SPAN methodology step by step walkthrough (replication)

Proposed ITaC phases

- The programme consists of 2 Projects
  - Project 1:
    - Phase 1a: Equity Market upgrade for trading only
      - Targeting Q3 2016 (dependent on T+3 implementation)
    - Phase 1b: Equity Derivatives Market
      - Targeting Q2/3 2017
    - Phase 1c: Currency Derivatives Market
      - Targeting 2 months after Phase 1b implementation
  - Project 2: Commodity Derivatives Market, Interest Rate Derivatives and Bonds Markets

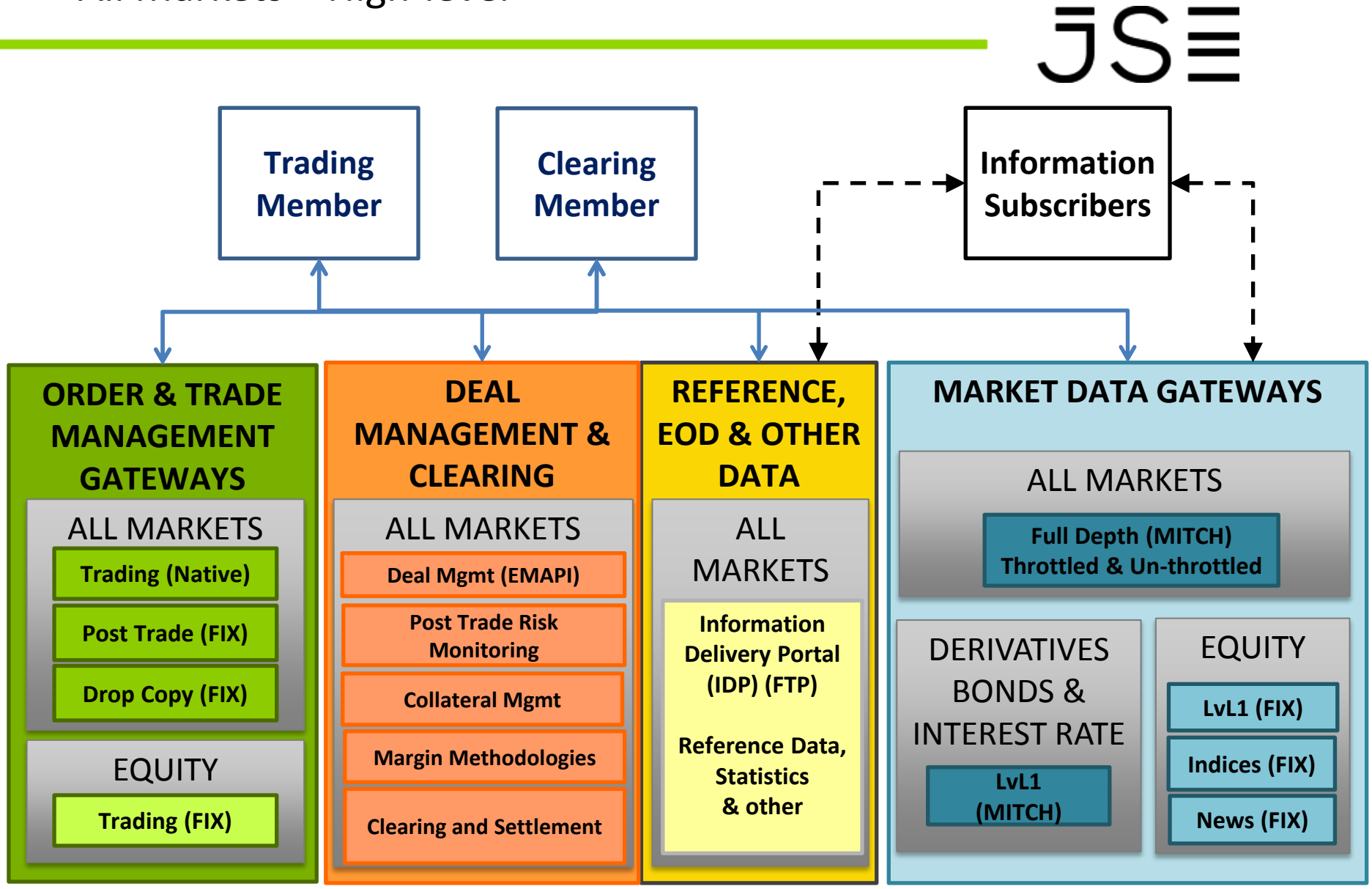
2015 Working Group (WG) Schedule

- Proposed 2015 WG Schedule

Date	Time	Status
Tues, 12 May 2015	11h00 – 13h00 SAST	Complete
Mon, 18 May 2015	10h00 – 12h00 SAST	Complete
Thurs, 28 May 2015	10h00 – 12h00 SAST	Combined into 3 June
Wed, 3 June 2015	10h00 – 12h00 SAST	Complete
Wed, 1 July 2015	10h00 – 12h00 SAST	Combine with/into 8 July
Wed, 8 July 2015	10h00 – 12h00 SAST	Complete
Wed, 15 July 2015	10h00 – 12h00 SAST	Complete
Wed, 5 Aug 2015	10h00 – 12h00 SAST	Combine with/into 24 Aug
Fri, 21 Aug 2015	11h00 – 13h00 SAST	Complete (CT checkpoint)
Mon, 24 Aug 2015	11h00 – 13h00 SAST	Complete
Mon, 21 Sept 2015	10h00 – 12h00 SAST	In Progress
Mon, 19 Oct 2015	10h00 – 12h00 SAST	Due to Eco-mobility festival combined into Nov WG
Wed, 18 Nov 2015	10h00 – 12h00 SAST	On track

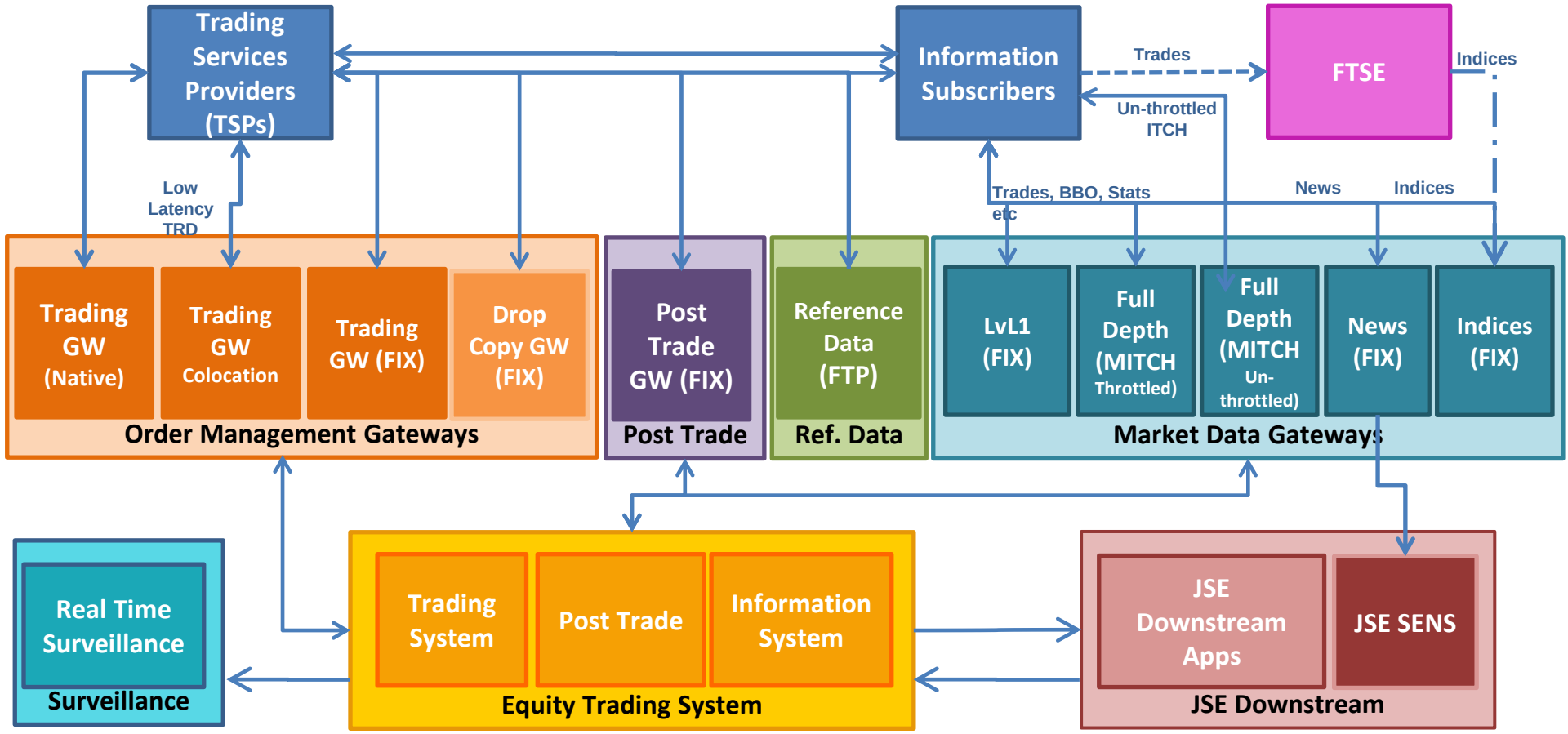
Trading, Clearing and Information Systems

All Markets – High-level



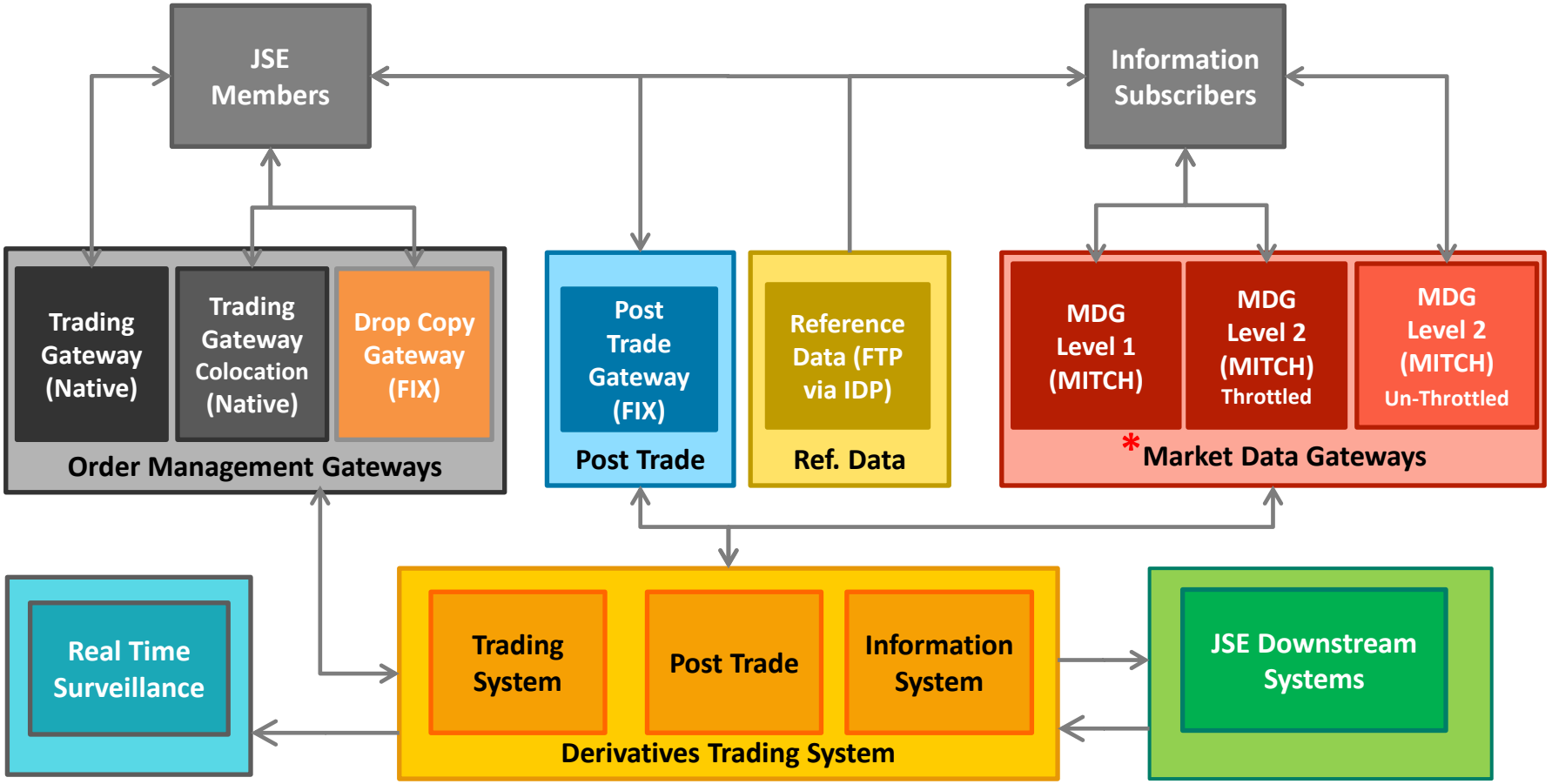
Trading and Information System

Current Equity Market



Trading and Information Systems

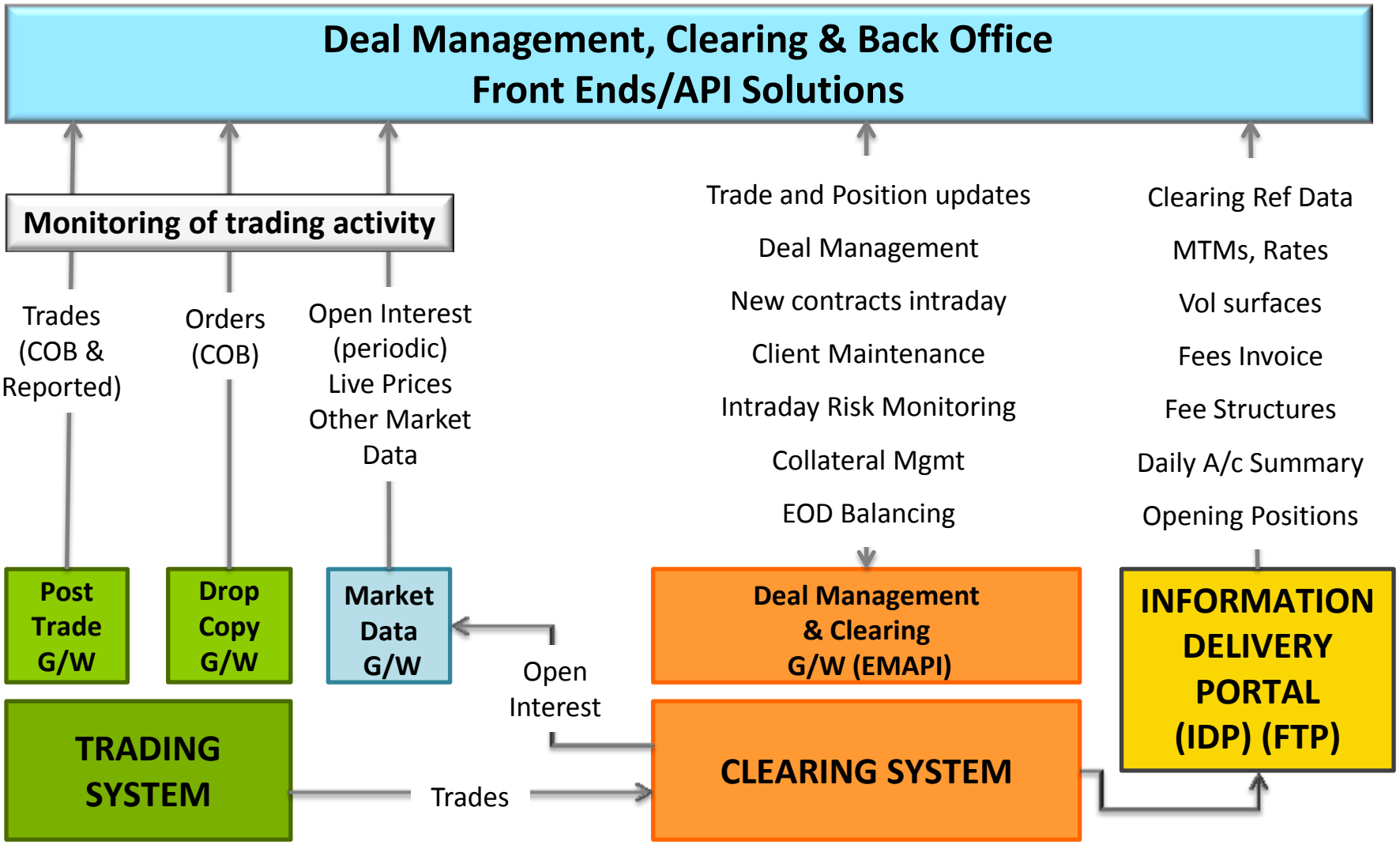
High Level Proposed Derivatives Solution



- There will be a set of Market Data Gateways for Equity Derivatives and a set of Gateways for Currency Derivatives
- * Additional market data gateways will be introduced at a later stage for Commodity Derivatives.
- Interest Rate market data will be disseminated via the same gateways as Currency Derivatives

Post Trade Interfaces

High Level Proposed Solution



Summary of Clearing Topics Covered To-Date

Clearing & Risk Management

Clearing overview & daily lifecycle

- Post-trade functions
- Intraday & EOD processes

Settlement

- Single EOD run
- EOD balancing
- Settlement of margins, interest on cash, fees etc.
- Ad-hoc intraday margin call

Collateral management

- Securities & foreign currency collateral
- EOD & intraday processes

Margin methodologies

- J-SPAN
- Margin add-ons
- HistVaR

Post trade (intraday) risk monitoring

- Setting of intraday exposure limits
- Exposure updates and alerts

Default management

- Client default
- Trading Member default
- Clearing Member default

Legend

- Covered
- Covered at high level, further coverage planned
- Not yet covered
- Covered today

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Pre Trade Risk Management

Principles and Considerations

- Comprehensive review of all existing controls which highlighted that certain controls are not effective and implemented at the wrong level

- Consideration of what pre trade controls are required was factored against the need for alignment with best practice and an appropriate balance of:
  - Protecting market integrity
  - Ensuring market quality
  - Providing user flexibility
  - Consideration of market activity e.g. On Book, RFQ, Off Book
  - Members taking more responsibility for risk management controls
  - Minimising administration overhead
  - Enabling competitive advantage for software providers to differentiate their service offerings to JSE clients

- Controls will reside at 3 levels
  - Trading Member
  - Clearing Member
  - Exchange

Pre Trade Risk Management

Risk Controls – High Level Categories

TRADING MEMBERS

- Orders
- Trades
- Permissions
- Price Movements
- Position Limits
- Proactive Monitoring
- Trader Limits
- Firm Limits
- Message Rates
- Obligations to Clearing Member

EXCHANGE

- Order Limits
- Trades
- Permissions
- Price Movement Controls
- Market Maker Protection
- Proactive Monitoring & Alerting
- Message Rate Throttling
- Error Trade Principles
- Cancel on Disconnect
- JSE Rules and Directives
- JSE Services Agreement
- JSE Operational Requirements
- Software Conformance
- Accreditation

CLEARING MEMBERS

- Drop Copy of Orders
- Drop Copy of Trades
- Ability to Cancel Orders
- Monitoring of Trading Member Exposure
- Agreement with Trading Members and their Obligations to Clearing Member

Clearing Member to Trading Members agreement with risk limits and obligations

Pre Trade Risk Management

Risk Controls – Trading Members

TRADING MEMBERS

- Orders
- Trades
- Permissions
- Price Movements
- Position Limits
- Proactive Monitoring
- Trader Limits
- Firm Limits
- Message Rates
- Obligations to Clearing Member

Trading Member Controls defined within trading frontend solutions

- Pre trade quantity and value limits per trader
- Pre trade quantity and value limits per order
- Order price monitoring for abnormal price movements
- Trader limits per individual order and reported trade size limits at instrument level
- Intra day and overall position limit management
- Proactive monitoring of automated order entry applications or client applications
- Appropriate testing of automated applications by trading members prior to go live in production
- Management of order message rate submitted by trading front-end to trading system
- Ensuring limits imposed by Clearing Member are implemented in applications and front ends

Pre Trade Risk Management

Risk Controls - Exchange

EXCHANGE

- Order Limits
- Trades
- Permissions
- Price Movement Controls
- Market Maker Protection
- Proactive Monitoring & Alerting
- Message Rate Throttling
- Error Trade Principles
- Cancel on Disconnect
- JSE Rules and Directives
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- Software Conformance
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Exchange Controls defined within the trading engine and gateways

- Market wide pre trade value and quantity limits on individual orders
- Pre trade price limits and circuit breakers at market , segment and instrument group level
- Pre trade price collars checks and controls
- Permissions set at member level per market
- Alert on Off Book Trade price band breach
- Message Throttle rate of input messages per second per Interface User ID (CompID)
- Suspend all or some Interface User IDs (CompIDs) on request of trading member
- Software conformance mandatory prior to application go live
- Certain protection controls for market makers
- Clear error trade policies with same day correction trade capability
- Clear order cancellation policies and ability to cancel stipulated orders on disconnect i.e. as defined when creating enablement
- JSE rules and directives will impose pre trade risk management obligations on trading members
- JSE Services Agreement (JSA) between JSE and trading member
- Other minimum requirements in JSE operational requirements
- Accreditation of Software Providers and Shared Infrastructure Providers (SIPs)

Pre Trade Risk Management

Market Limits - Maximum Order Size/Value

- Maximum Order Size
  - All orders entered by a Interface user ID (CompID) will be validated against the specified max order size
  - If the submitted volume/quantity is greater than the specified parameter the order will be rejected
  - Each side (buy and sell) of a quote* will be separately validated for the max order size

- Maximum Order Value
  - All orders/quotes will be rejected if the order value is greater than the applicable max order value for the user
  - The bid and the offer of a quote will be separately validated against this validation
    - Bid side will be validated first

** A quote is a single messages used to generate a buy and sell order simultaneously*

Pre Trade Risk Management

Order Value Calculation for Derivatives

- When calculating the order value of un-priced orders entered during Regular Trading, Pause or CPX sessions, the price of the contra side best bid/offer will be considered as the price of the order
  - If the contra-side of the order book is empty, the Dynamic Reference Price (DRP) of the instrument will be considered as the price of an un-priced order
  - In absence of both the contra side best price and the DRP, the order will be accepted by the system without performing any validations

- When computing the order value of un-priced orders entered during auction call sessions, the indicative auction price available at the time of the order entry will be considered as the price of the order
  - If the indicative auction price is unavailable, the DRP of the instrument will be considered as the price of the order
  - In the absence of both the indicative auction price and the DRP, the order will be accepted by the system without performing the maximum order value validation

- The same will apply to parked orders undergoing election

Pre Trade Risk Management

Permissions

- Trading Members will be permissioned at a market level for each Interface User ID (CompID) even though the following gateways will exist:
  - Equity Market
  - Equity Derivatives, Currency Derivatives and Interest Rates Markets
  - Commodities and Bond Market

- Interface user IDs (CompIDs) will be assigned, created and permissioned by the JSE during the enablement process
- IP address validation will be performed by the system on connection and login
- An Interface User ID (CompID) for a trading member can be provided to a clearing member on behalf of the trading member to cancel orders in exceptional circumstances
- Trading and clearing members should however note the consequences of allowing this and accept accountability for it

Pre Trade Risk Management

Market Maker Protection (MMP)

- Market maker protection (MMP)
  - 5 types of protection limits available:
    - Value Limit
    - Volume Limit
    - Fill Limit
    - Value Delta Limit
    - Volume Delta Limit
  - Protection limits can be set up in various ways
    - Per Segment for all Instruments (Futures and Options)
    - Per Segment for Futures **or** Options
    - Per Underlying and All Instruments
    - Per Underlying for Futures **or** Options

Pre Trade Risk Management

Market Maker Protection (MMP)

- Monitoring Protection Limits
  - The system monitors whether any of the protection parameters of the particular user are breached for each of the executions that happen for the assigned instrument selection during the Monitoring Period
  - If the particular instrument is assigned to the user via an underlying (or underlying + instrument definition), then any executions for this instrument or any other instrument with the same underlying (or underlying + instrument definition) within the same monitoring period causes the values being monitored to be updated
  - If the particular instrument is assigned to the user via a segment (or segment + underlying), then any execution to this instrument or any other instrument in the same segment (or segment + instrument definition) within the same monitoring period causes the values being monitored to be updated

Pre Trade Risk Management

Market Maker Protection (MMP)

If during a monitoring period, the calculated protection values for a market maker for an assignment exceed any of the specified limits, then all orders/quotes for the particular user belonging to the following categories are automatically cancelled

- Instruments in the particular assignment
  - E.g. If a protection limit is breached for a segment, the orders/quotes for all instruments belonging to the specified definition in that segment for the particular user are cancelled
  - If a protection limit is breached for an assignment via an underlying, the orders/quotes for all instruments belonging to the specified definition with that underlying for the particular user are cancelled

- Instruments that have legs which belong in the particular assignment
  - A market maker protection limit is set up by assigning ABC as the underlying and Options as the instrument definition
  - Market Maker has active quotes for some of the options based on ABC
  - Market Maker also submitted quotes for a strategy with ABC as a leg
  - When the Volume limit of the Market Maker for ABC based options breaches, all his orders/quotes in ABC based options as well as strategy with those options as legs get cancelled

Pre Trade Risk Management

Market Maker Protection (MMP)

- This functionality is applicable to:
  - Orders, quotes submitted as single quotes as well as quotes submitted as mass quotes
  - Implicit trades (i.e. leg trades) due to trades in synthetic instruments also count towards the limits
  - Protection limits are evaluated only after each aggression. Hence, an aggressing order may take the actual exposure of the particular user beyond the specified threshold limits. However, on partially execution, the remaining quantity is cancelled at the end of the aggression without adding it to the order book
  - If a threshold limit is exceeded for a market maker in the middle of an auction, the planned auction is completed and no orders/quotes are cancelled during the auction. Once the auction has completed and if there are any remaining quantities of orders/quotes belonging to the market maker, they are cancelled
  - When an incoming (or aggressive) Quote of a Market Maker executes and breaches any MMP limits during an execution, the system cancels all relevant orders and quotes of the Market Maker including both the sides of the aggressive quote

Pre Trade Risk Management

MMP Limit Types

- Value Limit
  - Value Limit is the maximum gross value of the orders and quotes that are allowed to be executed within a monitoring period for the specified underlying, underlying + instrument definition, segment or segment + instrument definition

$$Total\ Value = \sum Traded\ Price \times Traded\ Size \times Contract\ Multiplier$$

- Volume Limit
  - Volume Limit is the maximum gross volume (i.e. size) of quotes that is allowed to be executed within a monitoring period for the specified underlying, underlying + instrument definition, segment or segment + instrument definition

$$Total\ Volume = \sum Traded\ Size \times Contract\ Multiplier$$

Pre Trade Risk Management

MMP Limit Types

- Fill Limit
  - Fill Limit is the total number of executions that are allowed within the monitoring period for the specified underlying, underlying + instrument definition, segment or segment + instrument definition

- Volume Delta Limit – defined in absolute terms
  - Applicable to Option Instruments

$$Net\ Volume = \sum (Buy\ Call\ Volume + Sell\ Put\ Volume) - (Buy\ Put\ Volume + Sell\ Call\ Volume)$$

  - Applicable to Futures Instruments

$$Volume\ Delta = \sum (Buy\ Volume - Sell\ Volume)$$

Pre Trade Risk Management

MMP Limit Types

- Value Delta Limit – defined in absolute terms
  - Applicable to Option Instruments

$$Value\ Delta = \sum (Buy\ Call\ Value + Sell\ Put\ Value) - (Buy\ Put\ Value + Sell\ Call\ Value)$$

  - Applicable to Futures Instruments

$$Value\ Delta = \sum (Buy\ Value - Sell\ Value)$$

Pre Trade Risk Management

Cancel on Disconnect/Logout

- Cancel on disconnect or logout
  - Ability to allow users to cancel all open orders/quotes
    - Option to exclude GTD/GTT orders
  - Allows users to be confident that they are not sitting in a moving market whilst having no connectivity
  - Will cancel all active orders
  - Can be set up **per order**
    - Field Cancel On Disconnect must be set to 'YES'
  - Disconnect delay
    - Allows management of orders in case millisecond disconnects are experienced

Pre Trade Risk Management

Cancel on Disconnect/Logout

- Combinations applicable in the Trading Engine

Enablement Setup: Mass Cancel on Disconnect/Logout	User Activity: User Specified Value in Order/Quote	Result: Order/Quote Cancelled (YES/NO)
YES	NO	NO
NO	NO	NO
NO	YES	NO
YES	YES	YES
YES	Not set	NO
NO	Not set	NO

Pre Trade Risk Management

Input Message Rate Throttling

- Ability to throttle message input rates
  - Managed by the Exchange
  - Forms part of the enablement process when Interface User IDs (CompIDs) are created per firm
  - Set on a User Level i.e. Interface User IDs (CompID) level to limit a certain amount of messages that are entered within a second
  - Inbound messages are received by the Gateway up to the limit set for the Interface User IDs (CompID) e.g. 100 messages per second

Pre Trade Risk Management

Input Message Rate Throttling

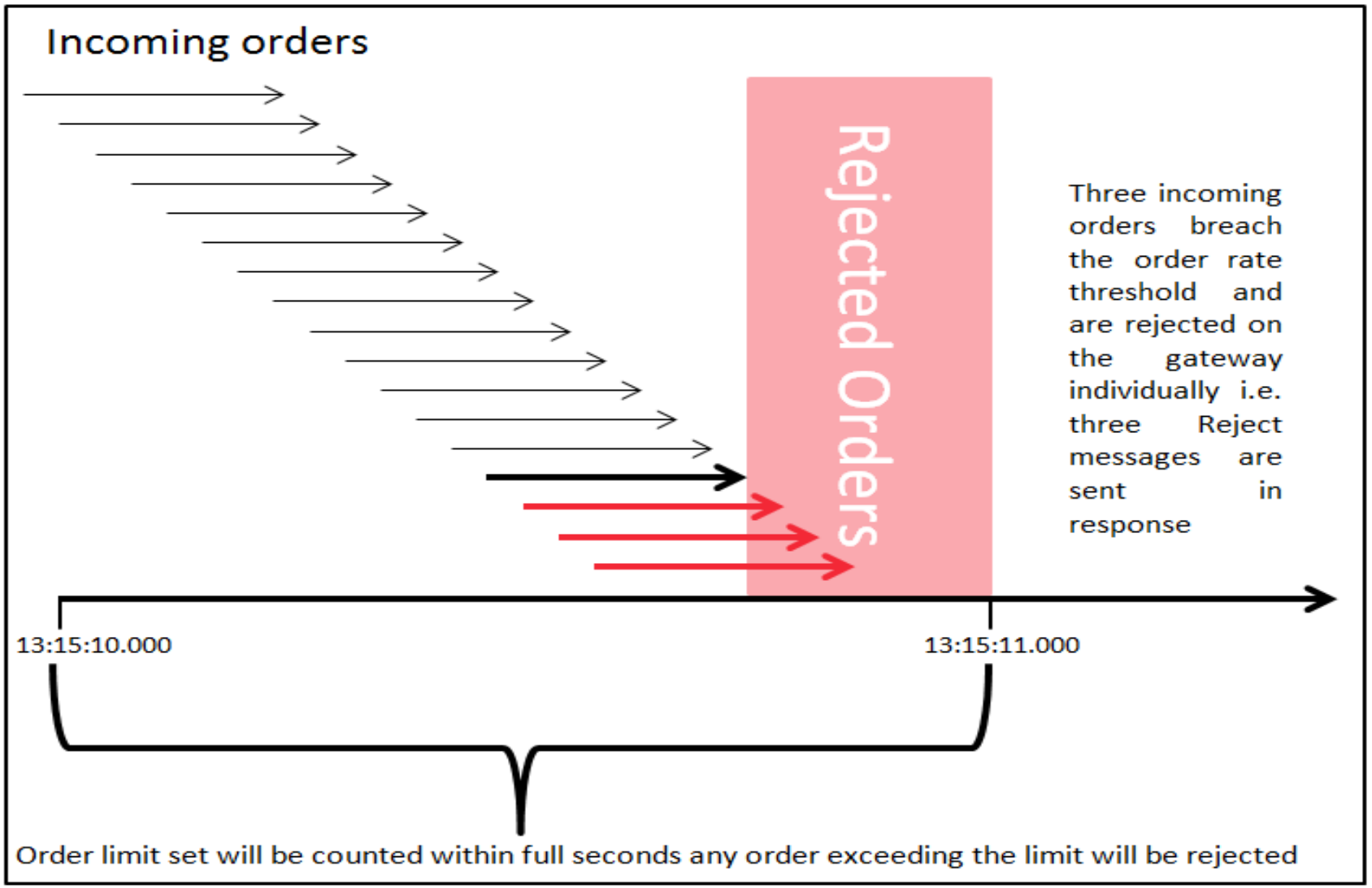
- Any orders that are received that breach this limit within the same second will be rejected at the gateway level with a Reject Message (3)

- Users are advised to design systems with limits in mind as throttling should be considered before order entry occurs
  - Set the message input rate to ensure it **never** breaches the Interface User ID (CompID) order rate

- Potential to have Interface User IDs (CompID) locked due to excessive breaching of the throttle rates

Pre Trade Risk Management

Input Message Rate Throttling



Pre Trade Risk Management

Kill Switch Concept

- Disable access to trade (kill switch concept)
  - JSE Market Operations can immediately disable access on an Interface User ID (CompID) level on instruction by Market Surveillance or the Trading Member
  - Member can automatically log off all Interface User IDs (CompIDs) with one logout message
  - JSE Market Operations can, upon request or as it deems fit, suspend any:
    - User
    - Trader
    - Trader group or
    - Trading Member (Firm)

Pre Trade Risk Management

Price Bands on Off Book Trades

- Price Bands
  - In the event that an Off Book Trade breaches a price band, an alert flag indicator (PbBreached) is sent on the TCR to the trading member and a notification of the trade is sent to the clearing member by the clearing system
  - Once a price band is breached, JSE Market Operations and Surveillance are also notified of the trade via an alert
  - JSE Surveillance may request transaction to be reversed or cancelled

Pre Trade Risk Management

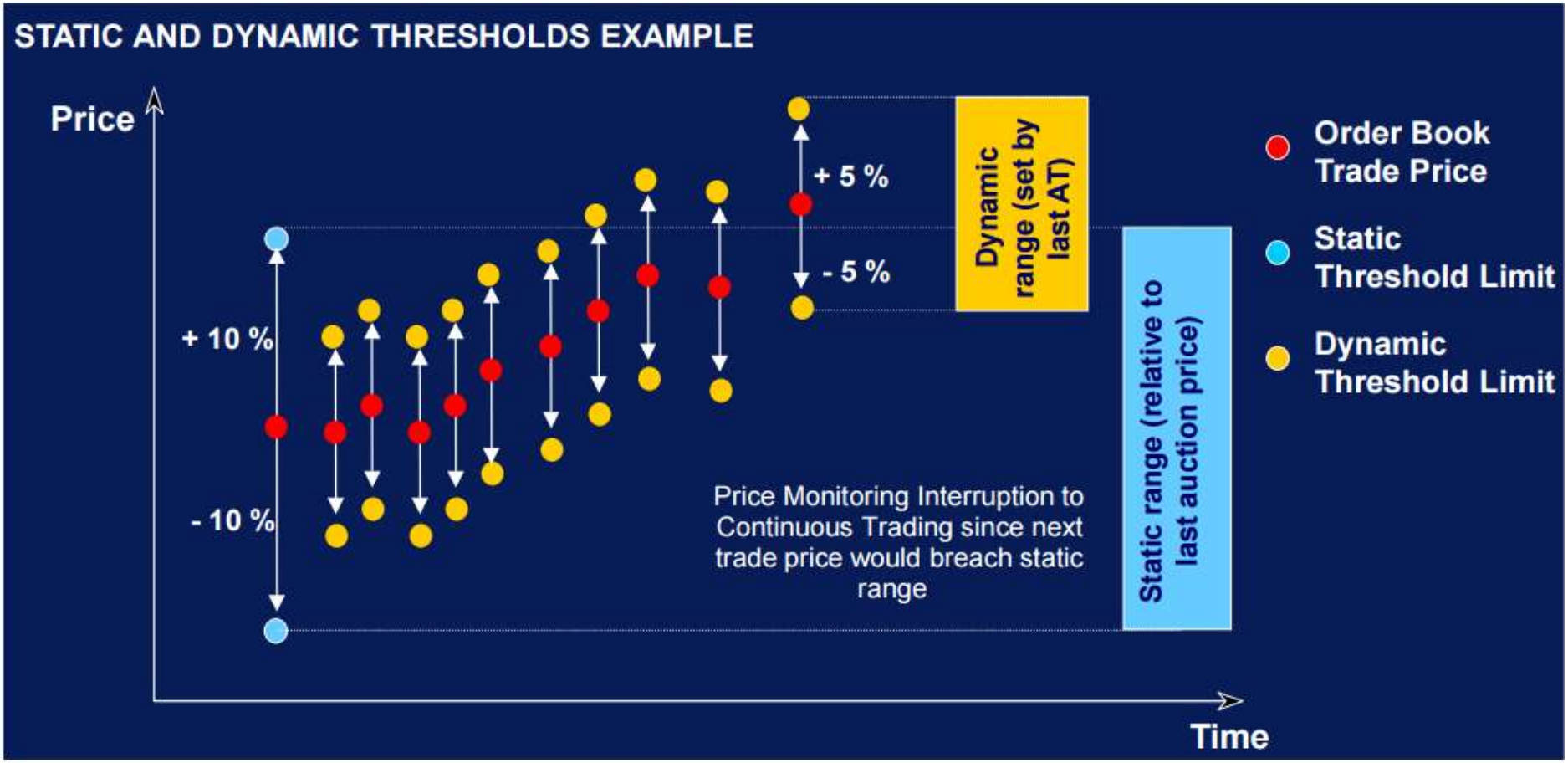
Circuit Breakers

- Circuit Breakers
  - Two types of circuit breakers exist in the Trading System
    - **Static Reference Price Circuit Breaker** - can be configured to refer the previous day's closing price or the last auction price
    - **Dynamic Reference Price Circuit Breaker** - refers to last traded price
    - The more restrictive limit will always take precedence
  - These can be set to either percentage values or static values
    - JSE will be implementing percentage values for all markets except for the commodities market where price limits will apply
  - Applicable to all orders aggressing the order book with matching potential on a pre-execution basis
  - Breaching orders trigger a volatility auction which will allow users to manage orders where no executions will take place
  - Volatility Auctions will be subject to
    - Price Monitoring Extensions or
    - Market Order Extensions

Pre Trade Risk Management

Circuit Breakers

Volatility Auctions - static and dynamic thresholds



Pre Trade Risk Management

Price Monitoring/Protection - Proposed

- Execution limits
  - Defined as a percentage or tick variation from the reference price of the instrument
  - Different percentage/ticks can be set for market and limit orders
  - Doesn’t affect the order, only controls the max/min price at which an order is executed
  - Typically used to control adverse, drastic price movements

Pre Trade Risk Management

Risk Controls – Clearing Members

CLEARING MEMBERS

- Drop copy of orders
- Drop copy of trades
- Ability to cancel orders
- Monitoring of trading member exposure
- Agreement with Trading Members and their Obligations to Clearing Member

Clearing Member Controls

- Ability to receive drop copy of all orders per member
- Ability to receive drop copy of all trades per member
- An Interface User ID (CompID) for a trading member can be provided to a clearing member on behalf of the trading member to cancel orders in exceptional circumstances
- Clearing member to trading member agreements with clearly defined obligations per party and with specific reference to firm and trader trading limits
- Engagement with trading members on behalf of who they clear to ensure that trading members enforce necessary pre-trade risk controls
- Monitoring of trading member exposure through real time messaging from RTC

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Post Trade Risk Monitoring

Monitoring and Triggers

- Intraday Risk Monitoring
  - Risk information provided to Trading Members (**TM**s), Clearing Members (**CM**s) and updated throughout the day
  - Information available on EMAPI
    - Initial Margin (**IM**), Additional Margin (**AM**), Variation Margin (**VM**), Collateral, Indicative Call
    - IM: J-SPAN, Large Pos. Add-on, Liq. Period Add-on
    - Aggregated for client, TM, CM
    - Updated throughout the day as new prices become available and positions are updated

- Thresholds
  - A threshold can be set on the margin call of a client
    - (IM + AM + VM) - Collateral vs. Risk Threshold
  - Exposures breaching their threshold are highlighted
  - JSE sets a global threshold
  - CMs can set a more conservative threshold for their TM's clients
  - TMs can set a more conservative threshold for their clients

Intraday Risk Monitoring
Example

Client Level

Clearing Member	Trading Member	Client	J-SPAN	Liquidation Period Add-on	Large Position Add-on	Settlement Margin	IM	AM	VM	Collateral Value	Indicative Call
AAA CM	AAA TM	AAA TM House	82 780	0	0	0	82 780	0	-16 507 557	100 000	-16 524 777
AAA CM	AAA TM	AAA TM BR1	439 700	25 000	0	35 000	499 700	0	558 317	499 700	558 317
CCC CM	CCC TM	CCC TM House	8 520 000	350 000	2 500 000	15 000	11 385 000	1 707 750	-2 869 199	9 200 000	1 023 551
CCC CM	CCC TM	CCC TM BR1	12 727 800	15 000 000	20 000 000	0	47 727 800	7 159 170	26 985 363	60 000 000	21 872 333
AAA CM	AAA2 TM	AAA2 TM House	59 200	0	15 000	0	74 200	0	37 338	100 000	11 538
AAA CM	AAA TM	AAA BR1 CL1	134 800	0	0	5 000	139 800	0	58 317	400 000	-201 883
BBB CM	BBB TM	BBB CL2	0	0	0	0	0	0	89 950	1 000	88 950
CCC CM	CCC TM	CCC TM CL1	46 620	0	0	0	46 620	6 993	26 985 363	50 000	26 988 976
DDD CM	DDD TM	DDD TM CL1	5 000	0	0	0	5 000	0	-47 500	0	-42 500

Trading Member Level

Clearing Member	Trading Member	J-SPAN	Liquidation Period Add-on	Large Position Add-on	Settlement Margin	IM	AM	VM	Collateral Value	Indicative Call
AAA CM	AAA TM	657 280	25 000	0	40 000	722 280	0	-15 890 922	999 700	-16 168 342
CCC CM	CCC TM	21 294 420	15 350 000	22 500 000	15 000	59 159 420	8 873 913	51 101 526	69 250 000	49 884 859
AAA CM	AAA2 TM	59 200	0	15 000	0	74 200	0	37 338	100 000	11 538
BBB CM	BBB TM	0	0	0	0	0	0	89 950	1 000	88 950
DDD CM	DDD TM	5 000	0	0	0	5 000	0	-47 500	0	-42 500

Clearing Member Level

Clearing Member	J-SPAN	Liquidation Period Add-on	Large Position Add-on	Settlement Margin	IM	AM	VM	Collateral Value	Indicative Call
AAA CM	716 480	25 000	15 000	40 000	796 480	0	-15 853 584	1 099 700	-16 156 804
CCC CM	21 294 420	15 350 000	22 500 000	15 000	59 159 420	8 873 913	51 101 526	69 250 000	49 884 859
BBB CM	0	0	0	0	0	0	89 950	1 000	88 950
DDD CM	5 000	0	0	0	5 000	0	-47 500	0	-42 500

Integrated Trading & Clearing (ITaC)
Post Trade Risk Management

Short Break

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Post Trade Risk Management

Margining Approach

- Single margin run across all markets
- Allows the JSE to give margin off-set where appropriate
- Markets will be migrated onto ITaC in phases
  - Equity Derivatives and Currency Derivatives targeting Q2/3 2017
  - Interest Rate Derivatives, Commodities Derivatives and Cash Equity thereafter

Post Trade Risk Management

Margin Requirements

- Initial Margin on go-live will be based on:
  - J-SPAN
    - Minor changes on volatility skew & VSR
  - Liquidation Period Add-on
    - Caters for positions that could take longer to liquidate than assumed under J-SPAN
  - Large Exposure Add-on
    - Caters for losses that could exceed margin held for J-SPAN & Liquidation Period Add-on

- Later Historical VaR will be introduced
  - Hist VaR to replace J-SPAN at some point
  - Allows for more intuitive margin off-setting
  - Hist Var is Based on
    - 1,000 volatility adjusted returns per underlying used to determine P&Ls
  - Adjusted for
    - Vega Risk
    - Calendar Spread Risk

- Additional Margin charged by the CM is added to Initial Margin

Post Trade Risk Management

Margin Replicating

All data required to replicate margin will be made available

- JSE Website – updated weekly
  - J-SPAN Margin parameters
    - IMR, CSMR, SSMR, VSMR, CSG, SSG
  - HistVaR Volatility Adjusted Return-array per underlying
  - Instrument Reference data

- IDP – updated daily
  - Settlement Prices
  - Rates
  - Risk Arrays
  - Instrument Reference Data
  - Parameters for Liquidation Period & Large Position Add-ons
  - Hist VaR P&L arrays

- Daily Margin Report
  - Contract-level details can be generated for all margin calculations if requested

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Introduction

- Initial Margin (IM) is intended to cover the Variation Margin (VM) payments of defaulting entities, from the point of default to the point at which the portfolio is completely liquidated (or auctioned off)
- Account level IM is calculated centrally by the Clearing House. Clearers can, however, call for additional IM from their clients
- IM for JSE Clear is calculated through the a portfolio scanning methodology; **J-SPAN**
- Each futures contract has **four** J-SPAN parameters. These parameters are calculated in accordance with the JSE Clear's risk tolerance, and are updated on a regular basis (typically fortnightly)

Reference Data

- The following instrument attributes are required by the J-SPAN framework:
  - Class Spread Group (CSG): a group on futures that share the same underlying instrument, and where calendar spread offsets will be applicable. Each tradeable instrument (options inherit the CSGs of their futures) can belong to only one CSG
  - Series Spread Group (SSG): a group of highly correlated CSGs. Series Spread Offsets are awarded when participants have long and short exposures in the same SSG. Each CSG can belong top only one CSG.
  - Contract Size: a number used to convert the quoted futures price to the equivalent notional exposure

Example: ALSI Reference Data

Name	Underlying	Expiry	CSG	SSG	Contract Size
Dec-15 ALSI	J200	17-Dec-15	ALSI	Equity Index	10

J-SPAN Parameters

- Initial Margin Requirement (**IMR**);
- Calendar Spread Margin Requirement (**CSMR**);.
- Series Spread Margin Requirement (**SSMR**);
- Volatility Scaling Range (**VSR**);

Example: ALSI Reference Data

Name	Expiry	IMR	CSMR	SSMR	VSR
Dec-15 ALSI	17-Dec-15	30,000	2,000	2,500	3.5

Mark-to-Market (MtM) Data

- The following MtM data is required in order to replicate J-SPAN:
  - Futures MtM prices
  - Options ATM volatilites
  - Option volatility surfaces

Example: ALSI Volatility Surface

Expiry/Moneydness	90%	95%	100%	105%	110%
17-Dec-15	4.2	2.4	0	-2.0	-3.3
17-Mar-16	5.1	3.1	0	-4.4	-5.6
15-Jun-16	6.0	4.5	0	-5.0	-7.2
15-Sep-16	7.7	5.7	0	-5.3	-7.6

The Risk Arrays

- A risk array is an array of instrument level profit and losses under a variety of Futures MtM and ATM vol scenarios
- A risk array is calculated for each tradable instrument
- The set of risk array scenarios are governed by three parameters:
  - A vector depicting the extent to which the Futures MtM should be changed, relative to the IMR of the particular Future. This vector is referred to as the Futures Scenario Set (**FSS**)
  - A vector depicting the extent to which the ATM volatility should be changed, relative to the VSR of the particular Future. This vector is referred to as the Volatility Scenario Set (**VSS**)
  - A liquidation Period (**LP**) defining the date for which contracts are to be revalued
- The FSS, VSS and LP parameters are defined globally

Example:

FSS = [-1;-0.75;-0.5;-0.25;0,+0.25;+0.5;+0.75;+1], VSS = [-1,0,+2], LP = 2-days

Risk Array Example

Scenario ID	Futures MTM Change	ATM Vol Change	PnL (Risk Array)
Scenario 1	Futures MtM + IMR $\times (-1)$	ATM Vol + VSR $\times (-1)$	- 30,000
Scenario 2	Futures MtM + IMR $\times (-0.75)$	ATM Vol + VSR $\times (-1)$	- 22,500
:			
Scenario 10	Futures MtM + IMR $\times (-1)$	ATM Vol + VSR $\times (0)$	- 30,000
Scenario 11	Futures MtM + IMR $\times (-0.75)$	ATM Vol + VSR $\times (0)$	- 22,500
:			
Scenario 19	Futures MtM + IMR $\times (-1)$	ATM Vol + VSR $\times (+2)$	- 30,000
Scenario 11	Futures MtM + IMR $\times (-0.75)$	ATM Vol + VSR $\times (+2)$	- 22,500
:			
Scenario 27	Futures MtM + IMR $\times (+1)$	ATM Vol + VSR $\times (+2)$	+ 30,000

Position Level Risk Arrays and Initial Margin

- A position level risk array is obtained by multiplying each element in the instrument level risk array by the position in the particular instrument
- The position level risk array thus depicts the position level profit and losses under a variety of Futures MtM and ATM vol scenarios
- The Initial Margin (IM) on an outright position in single tradable instrument would be the absolute value of the smallest element in the position level risk array
- An expiry level risk array is obtaining by aggregating all position level risk arrays at an expiry, and CSG level
- The IM on a portfolio consisting of a position in a futures contract, and a set of positions in options on the same futures contract, with the same expiry date, will be the absolute value of the smallest element in the expiry level risk array

Calendar Spread Margins

- The term “calendar spread” is often used to describe a transaction involving a long position in a futures contract on a particular underlying instrument, and a simultaneous short position in a futures contract on the same underlying, but for a different expiry date
- J-SPAN recognizes the risk reducing impact associated with having long and short exposures in different contracts in the same CSG by reducing the total amount of initial margin required against the net exposure. In particular, the total amount of initial margin on a calendar spread position involving two contracts (A and B) in the same CSG, is approximately calculated as follows:

$$IM_{CSG} = Pos_A \times CSMR_A + Pos_B \times CSMR_B + |Pos_A \times IMR_A - Pos \times IMR_B|$$

- If no calendar spread positions are associated with the particular CSG:

$$IM_{CSG} = \sum_{Expiry\ Dates \in CSG} |\min(Expiry\ Level\ Risk\ Array)|$$

Series Spread Margins

- The term “series spread” is often used to describe a transaction involving a long and short positions in a futures contracts on underlying instruments which are highly correlated with one another
- J-SPAN recognizes the risk reducing impact associated with having long and short exposures in different contracts in the same SSG by reducing the total amount of initial margin required against the net exposure. In particular, the total amount of initial margin on a series spread position involving two contracts (A and B) in the same SSG, is approximately calculated as follows:

$$IM_{SSG} = Pos_A \times SSMR_A + Pos_B \times SSMR_B + |Pos_A \times IMR_A - Pos \times IMR_B|$$

- If no series spread position are associated with the particular CSG:

$$IM_{SSG} = \sum_{CSG \in SSG} IM_{CSG}$$

- The account level IM is then the sum of IM_{SSG} across all SSGs associated with the particular account

Questions?

ITAC@jse.co.za

+27 11 520 7384