Quality Measures and Gap Analysis

CFTC Technology Advisory Committee

Subcommittee on Automated and

High Frequency Trading

Working Group #2

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WG2 Team Members

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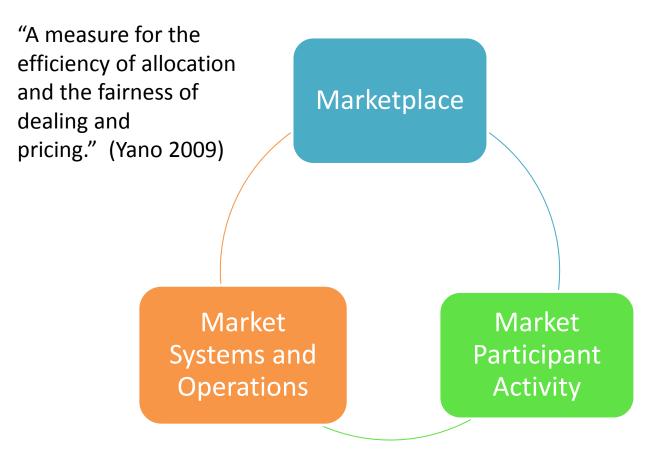
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Assignment

Working Group 2 was asked to comment on issues regarding Quality and Data

- Quality can be examined in the following areas:
  - Marketplace
  - Market Participant Activity
  - Market Systems and Operations
- Gap Analysis

Areas for Quality Measures

"A measure for the efficiency of allocation and the fairness of dealing and pricing." (Yano 2009)

Marketplace

Market Systems and Operations

Market Participant Activity

MARKETPLACE QUALITY

Marketplace Quality

"Market quality measures price discovery, liquidity, and volatility." (Brogaard 2010)

Market Quality

- Liquidity ⬆
- Price Discovery ⬆
- Volatility ⬇
- Cost of Trading ⬇

MARKET PARTICIPANT QUALITY

Market Participant Quality

- How close are orders resting to the top of the book?

- How much displayed liquidity (quantity) is provided?

- How persistent are the resting bids and offers?

- How quickly are the orders adjusted given changing values?

Market Participant Quality

- Recent Study Hagströmer and Nordén (2012)
- Study categorized HFT activity by strategy type – HFT Market Making versus HFT Opportunistic
- Majority of HFT trading volume and more than 80% of limit order submissions were associated with Market Making
- Found that policies aimed at limiting the scope of HFT will primarily hit market makers. These policies include:
  - Imposing a minimum limit order duration on orders
  - Imposing reduced order-to-cancel trade ratios
  - Transaction taxes

Quality Study

- Recent Study led by Professor Sir John Beddington (2012) (Over 150 leading academics from more than 20 countries have been involved in the work which has been informed by over 50 commissioned papers, which have been subject to independent peer review.)
- Study finds that CBT (Computer Based Trading) has:
  - Improved Liquidity
  - Improved Price Discovery
  - Not increased Volatility
  - Reduced Transactions Cost
- Study findings are similar to Hagströmer and Nordén findings in that imposing minimum limit order duration on orders and reduced order-to-cancel trade ratios will be problematic to the overall quality of the market.

MARKET SYSTEM QUALITY
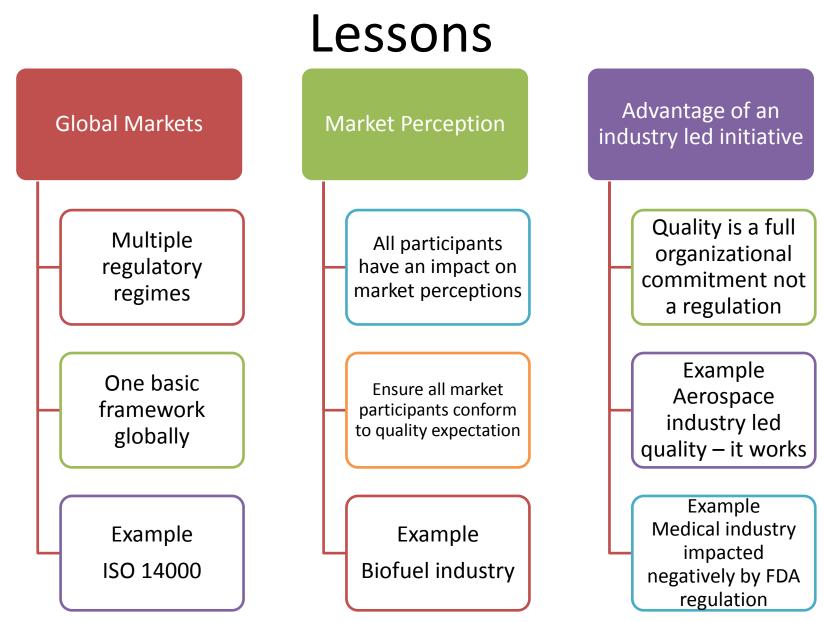
Market System Quality

- Market quality can be affected by issues of market system quality
- Industry has responded by publishing best practices and guidance covering systems and operational risk topics
  - FIA Divisions (IT, PTG and EPTA)
  - FOA
- Regulators are responding
  - ESMA
  - ASIC
  - SMA
- An independent effort emanating from Illinois Institute of Technology has been launched to create a Quality Management System Standard for automated trading (ANSI, X9, ISO)
  - Interim AT9000 working group
  - Draft standards created
  - Formal working group to start in November

Market System Quality

Thoughts on Quality	W. Edwards Deming	If you can't describe what you are doing as a process, you don't know what you're doing.
		Quality is everyone's responsibility.
	Phil Crosby	Quality is the result of a carefully constructed cultural environment. It has to be the fabric of the organization, not part of the fabric.

Why consider a Quality Management System Standard?

Market Quality is Interdependent	• All market participants are responsible • Quality is only as good as the least performing participant
Principles based	• Focus on the "WHAT" • Not the "HOW"
Are you willing to vouch for and guarantee your counterparties' quality?	• No one is in a position to do this • This is the role of the QMSS

Lessons

Global Markets

- Multiple regulatory regimes
- One basic framework globally
- Example ISO 14000

Market Perception

- All participants have an impact on market perceptions
- Ensure all market participants conform to quality expectation
- Example Biofuel industry

Advantage of an industry led initiative

- Quality is a full organizational commitment not a regulation
- Example Aerospace industry led quality – it works
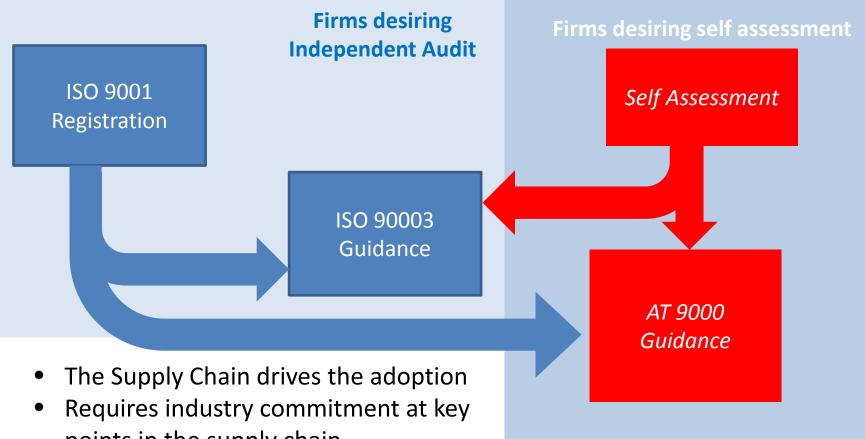- Example Medical industry impacted negatively by FDA regulation

AT 9000

- Other industries faced with automation and safety risks have turned to industry developed voluntary quality management systems.
- The Industry, especially the FIA, has responded by developing industry business best practice guidelines.
- Separately an initiative was started to create a quality management system standard for automated trading under the ISO 9000/9001 framework.
- The AT 9000 effort has cross referenced and used the FIA and FOA business practices as inputs.
- Standard is voluntary
  - Self assessment
  - Independent certification

QMSS Standards Are Voluntary

Firms desiring Independent Audit

Firms desiring self assessment

ISO 9001 Registration

Self Assessment

ISO 90003 Guidance

AT 9000 Guidance

- The Supply Chain drives the adoption
- Requires industry commitment at key points in the supply chain

Existing ISO Standards

ISO 9000

ISO 90003 Guidance

ISO 9001 Registration

ISO 12207

Quality Management System Standard
For Automated Trading

AT 9000

AT 9000

PTG/EPTA
Software Development and Change Control

Risk Controls for Trading Firms

Order Handling

Access Risk Management

FOA
GUIDANCE ON SYSTEMS AND CONTROLS FOR ELECTRONIC TRADING ENVIRONMENTS

esma Guidelines
Systems and controls in an automated trading environment for trading...

AT 9000 Timeline

Date	Milestone
7/2012	Informal Working Group draft
9/2012	New work item was approved by X9
10/2012	Informal working group draft
11/2012	X9 forms formal working group – need industry participants
12/2012	X9 completes review and revisions
1/2013	X9 Ballot for approval
1/2013	Education Process starts
2/2013	Propose ISO TC68 New work item
4/2013	ANSI Quality Management System for Automated Trading Issued
12/2013	ISO Quality Management System for Automated Trading Issued

DATA ISSUES
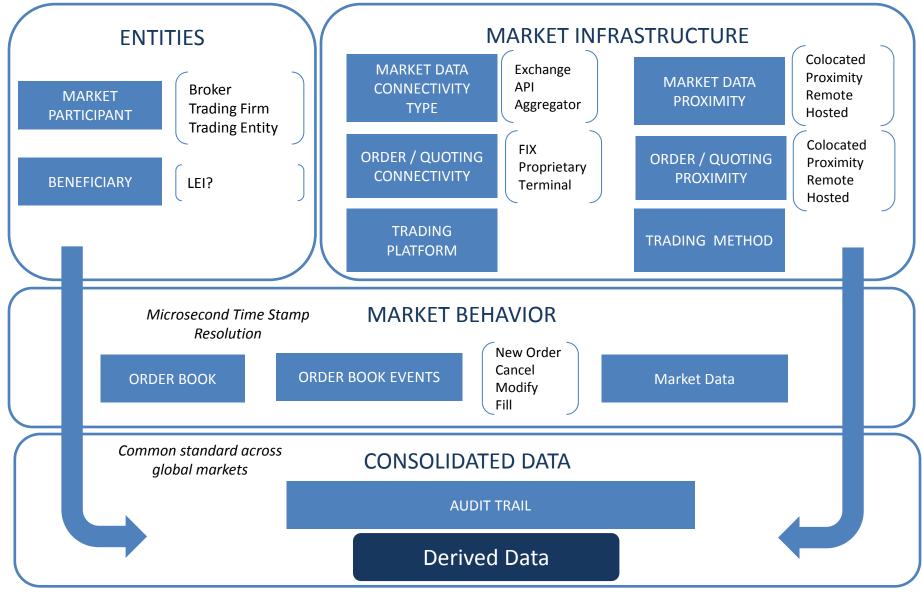
Market Behavior Data Gap Analysis

- The Futures Markets have the benefit of having SROs that provide the vast majority of data available now
- The CFTC should pursue industry standard data formats and definitions
- The FIX standard provides data item definitions and data model that are widely adopted by industry participants
  - Simple
  - Easy to access
  - Industry accepted
  - The FIA has provided quite a bit of enhancements to capture relevant data within FIX standard for automated trading already

Audit Data and Time Clocks

- Audit trail data should be collected in a way that enables meaningful aggregation, reconstruction, and analysis.

- Critical tools to enhancing regulators' ability to reconstruct and properly sequence activity include: uniform market participant identifiers, consistent approaches to the type of data to be collected, and the use of accurate time-stamp mechanisms.

- Precise time-stamping is critical to reconstructing and sequencing market events.

However, current state-of-the-art methods of clock synchronization still result in material differences versus actual time. Server clocks are inaccurate, and even after synchronization, they drift. This reality poses a significant hurdle in efforts to coalesce data that has been time-stamped by multiple clocks, across multiple trading venues.

Audit Trail Data Model

ENTITIES

| MARKET PARTICIPANT | Broker
Trading Firm
Trading Entity |

| BENEFICIARY | LEI? |

MARKET INFRASTRUCTURE

| MARKET DATA CONNECTIVITY TYPE | Exchange
API
Aggregator |

| ORDER / QUOTING CONNECTIVITY | FIX
Proprietary
Terminal |

| TRADING PLATFORM |

| MARKET DATA PROXIMITY | Colocated
Proximity
Remote
Hosted |

| ORDER / QUOTING PROXIMITY | Colocated
Proximity
Remote
Hosted |

| TRADING METHOD |

MARKET BEHAVIOR

Microsecond Time Stamp Resolution

| ORDER BOOK |

| ORDER BOOK EVENTS |

New Order
Cancel
Modify
Fill

| Market Data |

CONSOLIDATED DATA

Common standard across global markets

| AUDIT TRAIL |

| Derived Data |

Examples of Derived data

Statistic	Aggregation Level	Unit	Description
Order Chain Duration	Per Order	Microseconds	Length of time order remained in book before being filled or cancelled
Order Duration	Per Order	Microseconds	Length of time order remained in book before being modified, filled, or cancelled
Average Order Duration	Per Trader Per Firm Per Instrument	Microsecond	Average order duration for all orders for a specific instrument.
Order to Fill Ratio	Per Trader SenderSubID(tag 50) Per Firm Per Instrument	Count	Number of orders entered to number of orders filled.
Order Efficiency	Per Trader Per Firm Per Instrument	Count	Execution Quantity or Notional Value (rather than execution count) to Quantity/Value entered/modified
Order Aggressiveness	Per Trader Per Firm Per Instrument	Count	Orders that are on/near the Top of the Book are more valuable/subject to more risk than those that are away from the market
Reject/Order Ratio	Per Trader Per Firm Per Instrument * by reject Reason	Count	Can indicate systems issues or risk issues