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January 21, 2014

European Securities and Markets Authority
Market Integrity Standing Committee
Mr. Konstantinos Botopoulos, Chair
market.integrity@esma.europa.eu

Re: Discussion Paper on Market Abuse Regulation
ESMA/2013/1649
Questions 42-47

Dear Mr. Botopoulos:

This letter provides answers to Questions 42-47 in the 14 November 2013 Discussion Paper on Market Abuse Regulation.

About Trillium

Trillium is an electronic trading and technology firm based in New York. Our trading division employs over 100 traders who actively buy and sell approximately 15 million shares of listed U.S. equities each day. All trading decisions are initiated manually by human traders without automation, so we do not consider ourselves "high frequency traders."

Trillium's technology group develops bespoke trading and compliance software to support and supervise our trading division. Our featured product, Surveyor, detects and analyzes potential instances of market manipulation using some of the same criteria set forth in the Discussion Paper. We have recently begun marketing Surveyor to trading and brokerage firms responsible for detecting manipulation under the governing regulations of their respective jurisdictions. Surveyor is intended for use by those firms that originate or transmit to trading venues significant volumes of daily order flow (>10,000 orders/day).

The detection logic contained in Surveyor is based upon Trillium's own experience with its regulator, FINRA. In 2010, a small group of Trillium traders were found to be engaged in "layering," the then-undefined practice of entering multiple, *non-bona fide* visible orders on one side of the market with the intent of creating a false impression of supply or demand. When a trader enters such orders, other *bona fide* market participants are induced to raise their bids or lower their offers to levels at which the manipulating trader can obtain more favorable execution prices than he could have otherwise. It took FINRA three years to manually assemble trading records from numerous sources to demonstrate that Trillium's

traders were layering, and when they presented their work to us, we readily agreed to pay a fine and to take remedial steps to prevent similar events from recurring.

Surveyor

Surveyor was the result of those remedial steps. Using our first-hand knowledge of the logic and analysis performed by FINRA in investigating our traders, we were able to design and develop software that examines (a) full Level II depth of book market data from multiple venues, and (b) a trading or brokerage firm's own customer order flow. Surveyor uses that data to detect instances in which a single trader or account is responsible for a high concentration of orders resting in the consolidated market-wide order book. Surveyor then scores those instances based upon (i) the extent of the subject account's order book concentration, (ii) whether market prices moved in relation to the concentration, and (iii) whether the subject account attempted to benefit from such a price movement by entering additional orders on the opposite side of the market. Instances with qualifying scores at the end of this process are presented in a graphical user interface that clearly displays exactly how the subject behavior may have been manipulative.

Today, Surveyor is used on a daily basis by Trillium's compliance department to identify and analyze market concentration events at Trillium. In addition, Trillium has recently begun offering Surveyor for sale to the industry, and is already in advanced testing at a number of major brokerage firms in New York.

Based on that testing, we have confirmed that Surveyor can accurately detect potential market manipulation events within very large batches of order activity with a high signal-to-noise ratio (few false positives). We have also found that some signals and indicators are more useful than others in accurately detecting and identifying market manipulation. This experience is relevant to Questions 42-47 in the Discussion Paper.

Trillium's Responses To Questions 42-47 in the Discussion Paper

42. In your view, what other ways exist to measure order cancellations?

Order cancellations, standing alone, are a poor indicator of market manipulation. Data from the SEC's recently released market structure website indicates that 20-30 orders are typically entered for each execution in US equities. Stated inversely, at least 19/20 (95%) of orders are typically cancelled without being executed. There are numerous reasons for this high overall cancellation rate, including the widespread use of routing algorithms and specialized order types to conceal supply and demand from would-be front runners, the

presence of high frequency traders, and the proliferation of dark pools. These factors are an inherent part of our current market structure and are not indicative of market manipulation.

Order cancellations can be useful indicators of market manipulation only when analyzed in conjunction with price movements in the subject securities. If the market price of a stock goes down after the cancellation of a significant number of visible buy orders, that combination of events suggests that the presence of the buy orders prior to their cancellation had a measurable effect on market prices. A regulator or compliance officer observing such events should then also consider: (1) whether the market price went up when the same buy orders were initially placed; (2) whether the trader entering the buy orders attempted to take advantage of the rise in market price by entering sell orders during the same interval; and (3) whether the trader obtained any executions from his buy orders. If the trader was able to move prices up with buy orders that he later cancelled without buying anything, and was active on the sell side during the interval that he elevated prices, manipulation has likely occurred. These are the indicators that our Surveyor tool looks for.

43. What indicators are the most pertinent to detect cross-venue or cross-product manipulation and which would cover the greatest number of situations?

The most pertinent indicator of any manipulation, both within and across venues or products, is the pairing of visible order concentration and correlated price movement. If a trader enters a significant number of orders on one side of the market, but the price of the security does not move in response (up for buy side activity or down for sell side activity), it is unlikely that any manipulation has occurred. If a trader enters a large number of hidden or dark pool orders, it is also unlikely that any manipulation has occurred because hidden and dark pool orders cannot influence other market participants. However, when a trader enters a significant number of visible buy orders, the price of the subject security goes up, and then the price returns to previous levels after the trader cancels those buy orders, an attempt at manipulation may have occurred, even if the trader was inactive during that interval on the same venue and in the same product. To detect cross-venue or cross-product manipulation, a regulator or compliance officer should examine whether, during such intervals of order concentration and price movement, the same trader or his affiliates were active in related venues or products. Once order concentration/price movement intervals have been isolated, checking activity in other related venues or products during those intervals becomes a much more manageable exercise.

44. Are there other indicators/signals of market manipulation that should usefully be added to this list appearing in Annex IV?

The list in Annex IV contains several important indicators of manipulation, but it also includes numerous behaviors that, in our experience, are poor indicators of manipulation.

As discussed above, order cancellations, considered in isolation, are a poor indicator of manipulation. For similar reasons, any analysis that isolates only execution data is also of minimal value in detecting manipulation. Execution data tends to be a poor indicator of a trader's intent. Many external factors determine which of a trader's 20-30 orders is the one that gets executed, greatly diluting the evidentiary value of each execution in determining the trader's intent. Furthermore, because actually entering into a large number of transactions necessarily entails taking on a large amount of *bona fide* market risk, high concentrations of executions are actually counter-indicators of manipulative intent.

The best indicator of manipulative intent is a significant concentration of visible orders on one side of the market coupled with a price movement towards the other side of the market. Unlike execution concentration, order concentration directly reflects trader intent. Because over 95% of orders are routinely cancelled, order concentrations can be displayed to the marketplace without exposing the trader to significant market risk. While a serious buyer may legitimately flood the market with many buy orders at once, traders who do so at price levels that are unlikely to be filled, or while also posting sell orders at the same time, or at volumes that are unusual for a particular instrument at a time when there is no market-moving news, should be examined closely.

45. *Which of the indicators of manipulative behavior/manipulation in an automated environment listed in Annex IV would you consider to be the most difficult to detect? Are there other indicators/signals of market manipulation that should be added to the list? Please explain.*

Each of the behaviors listed in the automated trading section of Annex IV is relatively easy to detect. "Pinging" dark venues with small odd-lot orders, and "quote stuffing" with high concentrations of orders, are both easy to detect due to the anomalous size or frequency of the orders.

Layering, spoofing, and momentum ignition are more difficult, but not impossible, to detect, with the proper tools. In order to find these indicators, regulators and compliance officers need a tool that analyzes both (a) the full Level II depth of book market data from multiple venues, and (b) all order messages transmitted by a single trading or brokerage firm. (It is necessary that these order messages each contain customer account identifying fields; in our experience, all trading and brokerage firms have internal order messages with those fields, but whether those customer-identifying fields are passed on to exchanges and/or regulators

varies from jurisdiction to jurisdiction.) From these data feeds, it is possible to detect intervals in which a single trader or account is responsible for a high concentration of the visible orders resting in the consolidated market-wide order book. It is then further possible to determine whether market prices moved in relation to the concentration, and whether the subject account attempted to benefit from such a price movement by entering additional orders on the opposite side of the market.

46. From what moment does an inflow of orders become difficult to analyze and thus potentially constitute an indicator of quote stuffing?

The limiting factor in analyzing many rapid order messages is the granularity of the time stamps applied by the exchanges to those messages. When exchanges time stamp order messages to the microsecond, there is no difficulty in analyzing those messages.

47. What tools should be used or developed in order to allow for a better detection of the indicators of manipulative behavior in an automated trading environment?

For the reasons stated above, our Surveyor tool is well suited for detecting manipulative behavior in an automated trading environment, and is available to all market participants with access to Level II depth of book market data and customer-identified order messages. Surveyor uses those data inputs to identify instances where a single account was responsible for a high concentration of orders within the market-wide visible order book. Surveyor then scores those instances based upon (i) the extent of the subject account's order book concentration, (ii) whether market prices moved in relation to the concentration, and (iii) whether the subject account attempted to benefit from such a price movement by entering additional orders on the opposite side of the market. Instances with qualifying scores at the end of this process are presented in a graphical user interface that clearly displays exactly how the subject behavior may have been manipulative.

I would be happy to make myself available to the Authority, to the Market Integrity Standing Committee, or to any other interested parties, for further discussion of our approach to detecting market manipulation. I can be reached at the address above.

Very truly yours,

Michael J Friedman
Chief Compliance Officer