Non-Live Testing of Algorithms
- Key Obligations on Trading Venues and Investment Firms in ESMA MiFID II Final Report

ESMA's Final Report Draft Regulatory and Implementing Technical Standards for MiFID II/MiFIR (ESMA/2015/1464) was published on 28th September 2015. The rules impose new obligations both on investment firms and trading venues governing non-live testing of algorithms on a vast range of instruments as defined in 2014/65/EU Annex 1 Section C.

These changes represent a paradigm shift to the way that algorithms are tested and in the type of test environments required on which to test them to meet regulatory requirements. **All firms that trade using algorithms are now faced with the problem of meeting these new regulatory mandated requirements, or not trading at all on European trading venues after 3 January 2017**.

From 3rd Jan 2017 trading venues will require their members "to certify that the algorithms they deploy have been tested to avoid creating or contributing to disorderly trading conditions"(RTS 7, Article 10, 1). Such tests and certification must be made both prior to initial deployment of algorithms and on any "substantial" update (ibid) and a "responsible party designated by senior management of the investment firm shall sign off the initial deployment or substantial update"(RTS 6, Article 5, 2). The member must also "explain the means used for that testing" (RTS 7, Article 10, 1). Additionally, as part of an annual assessment, the investment firms must retest their algorithms to "ensure that they are capable of withstanding increased order flows or market stresses" (RTS 6, Article 10).

The purpose of testing for disorderly trading conditions is to "recreate real market conditions to ensure the well-functioning of algorithms under changing circumstances" (3.2.33) and must include tests that show that the algorithm "can continue to work effectively in stressed market conditions"(3.1.16).

Testing requirements are to apply to all algorithms except "pure investment decision algorithms which generate orders that are only to be executed by non-automated means and with human intervention"(Ch3, Recital 4) and where the same algorithm is used on multiple trading venues separate tests must be made (3.2.38). Trading venues "shall not be obliged to validate the outcome" of tests (RTS 7, Article 10, 2). Neither "disorderly trading" nor "stressed conditions" is defined, though ESMA states that the latter relate to "significant short-term changes in prices and volumes" (3.3.14).

MiFID II also lays an obligation on trading venues to "provide their members with an environment" for the purpose of non-live testing (RTS 7, Article 10, 3). One option stated by the regulators is for the venue to offer a simulated environment "which reproduces as realistically as possible the live production environment, including disorderly trading conditions, and which provide the functionalities, protocols and structure that allow members to test a range of scenarios that they consider suitable to their activity"(ibid).

To the best of our knowledge TraderServe AlgoGuard is the only such platform commercially available and currently in production at a major exchange. AlgoGuard creates a fully functional exchange emulated test environment able to reproduce market microstructures that react to trading activity and that can also recreate stressed market conditions and the behaviours of other antagonistic algorithms operating in the market. Within this sophisticated test environment AlgoGuard offers pass/fail testing against predetermined indicators of disorderly market behaviour and allows for testing of algorithms that trade multiple markets. AlgoGuard does not require disclosure of the algorithms being tested which remain on the client's own servers.

In response to concerns in the industry that such a technology was "fundamentally unachievable" (3.2.36) ESMA has deemed that trading venues may also discharge their obligation to providing a disorderly trading environment by simply offering "testing symbols" which multiple algorithms can access (3.2.37). Obviously, in contrast with the first option, this is not a controlled environment and cannot be guaranteed to produce realistic or stressed conditions for testing. As such we cannot see how an investment firm needing to certify the stability of its algorithms could rely on testing of such a kind to meet its regulatory obligations. Similarly, an environment which is based on static replay of historical data can never be suitable for these purposes as it will be fundamentally incapable of modelling the test market's response to a tested algorithm - the very thing most likely to create market disorder. For realistic testing (3.2.33) it is essential to have, like AlgoGuard, a single orderbook in which orders emulating the real market can interact with orders from the algorithm under test.