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Melissa D. Jurgens, Secretary of the Commission
Commodity Futures Trading Commission
Three Lafayette Centre
1155 21st Street NW
Washington, DC 20581

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Re: RIN 3038–AD52
http://comments.cftc.gov

Please accept this submission in response to the CFTC's Concept Release on Risk Controls and System Safeguards for Automated Trading Environments .

As a practitioner and adviser during a half century of observing the interplay of risk management, data management and technology in financial markets, I am pleased to offer my observations on the CFTC's consultative paper. These observations, while my own, have been developed with input from many industry members and regulators who allowed me to advise them on matters of consequence while at the same time learning from them over this time period. A brief research note summarizing these observations are included as an Appendix – the First Fifty Years. A brief bio is included following the Appendix.

My overreaching observation is the absence of recognition of global forces at work in which the CFTC must carry out its regulatory mandates. Financial institutions and markets are global and know no sovereign boundaries. At the same time financial markets are globally integrated from a functional point of view but not from a regulatory or technical perspective. This has led to not only regulatory arbitrage but information arbitrage.

Regulatory arbitrage has always been with us, the consequence of different societies forming their own sub-cultures around lending institutions, markets and their regulations. However, there is now a slow but steady recognition of a new vision taking shape that markets and financial institutions need to be regulated with some consistency. The first instance of this was the first Basel initiative to standardize credit markets by establishing the amount of capital globally active banks need to retain. The observation that the weakest link in the chain will bring the entire chain down was its impetus. We are now in the third iteration of the Basel capital accords with more revisions yet to come. A lot still needs to be done, primarily around supremacy of simplification over complexity, but importantly around data standardization and aggregation. The recent consultative papers from the Basel committee speak to these issues.

Toward this same end the G20 has given a mandate to its new creation, the Financial Stability Board to "stabilize the global economy" after the financial crisis of 2007-2008. To their credit one of the first initiatives the FSB accepted, punted to them nearly three and a half years ago by the US's newly established Office of Financial Research was the Global Legal Entity Identification (LEI) project. This is to be a standards mechanism that would allow the 'fixing of the plumbing" of the global financial system. Another initiative, equally important is to create a consistent mechanism for implementing derivatives reform with a particular early emphasis on swaps regulation. Data standards and data aggregation has become of paramount importance here as well.

It was recognized by all that without a computer readable global identification system for identifying participants in the financial supply chain, and eventually the instruments and contracts they trade in, no amount of automation would be effective for either risk management or trading on a global scale. In today's technology era information is available at light speed. Those with faster computers, networks and algorithms have an information advantage, what we call "information arbitrage".

In the US regulatory silos prevent regulation from following what science now allows - integration (or rather federation) of markets, risk controls and trading platforms. However, without a global view, risk controls, no matter how automated will not prevent a systemic contagion from occurring again, whether it be brought on by errant trades or by capital depletion.

That said, the CFTC has, through this consultative paper, placed a significant number of thoughtful and thought provoking questions before us all.

There are three main points I would like to make about related to questions on credit hubs, resting orders and information advantage, all in the context of the reality that:

1. trading markets and financial institutions are both interconnected and global, and
2. technology has outstripped our ability to implement the possibilities that it provides for risk managing trading markets

Systemically important financial Institutions, the ones defined in the new category of financial institution known as SIFIs have been placed at the forefront of global regulation by both the Financial Stability Board and the US's Financial Stability Oversight Committee. We need them to lead us into a new era of cooperation before we let them loose on the old regime of competition. They collectively trade or process over three-quarters of the world's financial transactions. Regulators, in cooperation with these SIFIs must lead our financial markets toward a level playing field, this time not just within sovereign government or regional regulatory regimes, but within globally consistent regulations led by data standards - for identification, for data tags, for risk analysis, and for prescribing trade input data and trade outputs.

The way to carry this out is through globally consistent and standard instrument and counterparty identifiers. With these we can aggregate positions across firms and financial infrastructure entities. This is also a problem for individual firms who also have to aggregate information across their organizations. This is neither done in a timely way or efficient way. It should be done in the same real-time context as the risks that are being taken. This aggregation ability is missing because the underlying identifying data and valuation information are neither synchronized across a company's many businesses nor across the many businesses comprising the global financial industry.

Real-time risk management is becoming more of a possibility with the continued build-out of the Internet, a pervasive global network of almost unlimited bandwidth. Coupled to it are massively parallel, almost unlimited computing capabilities embraced through federated BIG Data real-time in memory data bases acting as a single processing engine and providing a virtual view of data. This takes the form of shared facilities available on demand in the form of computational utilities provided as a service, referred to as cloud computing. Whether obtained by individual firms or for collectives of shared and interconnected networks it is a simple thought to contemplate that armed with such capability an industry participant could see and calculate the amount of risk building up in real time with a counterparty or a market regulator could catch an errant trade or waves or trades before it became a problem.

The first requirement is to be able to bring together all electronically traded markets so that an institutional or professional trader's order entered anywhere in the interconnected market system can first be validated against their available credit or cash limits, a virtual credit hub if you will. This is not unlike when an individual trades through its online broker. A trade cannot be accepted unless it is validated as having enough borrowing power or cash in the account. The additional requirement is that that same customer must be visible in the system as a single credit limit across all introducing financial intermediaries. Most importantly, for institutional size trades is the ability to actually pull sitting orders out of market center books, when a resting order would have executed through a credit limit; as bid/asked quotes change; and/or as an immediate last/next execution price would cause a resting order to be triggered.

To do this the industry would need to accept a systemic risk overseer to grant to all, the same time-out to do the risk checking before the market's next move. This would enable a "peek around the corner" to see what would happen to that account or counterparty if a trade would be executed that would cause the counterparty to exceeds its credit limits.

A lot more risk management thinking is required, not only at the pre-trade level but at the later stages of actual trade payment or failure of payments. Here is where the entire infrastructure underpinning global payment and settlement systems needs fixing. This starts with basic blocking and tackling: rationalizing symbols, business and product identifiers and providing for real-time clearing for all electronically-traded products. Trading firms can send out and match thousands of orders a second. The technology is available to confirm and clear them just as fast, held back only by the lack of political will to standardize around best practice identifiers and other referential data. This is the still-unrealized vision of Straight-Through-Processing.

In summary, it is a simple thought to contemplate that if we could only catch the problem before it becomes a problem we would be in risk management nirvana. Can we do this? Yes, the technology makes this possible. Here is one set of possible approaches:

1. duplicate order books mirrored in a federated Risk Management Utility (RMU), bringing together virtually, not literally all electronically traded markets; here is where we borrow the milliseconds from all to do the millisecond pre-trade/shadow post trade (see point 6 below) risk checking;

2. entry of account level/product level credit/limit details placed through a market center intermediary and delivered up stream via federation to the virtual Risk Management Utility

3. use of automated risk management tools i.e. risk adjusted margin value, risk adjusted portfolio value, position limits, trade and order size limits, intra-day net short-long, product permissioning, order frequency per time interval, maximum order quantities per trader/per product, orders placed within pre-defined price ranges, borrowing contingencies, uptick monitoring, etc.;

4. definition of account level, to consider the multiple accounts that trade through a single omnibus account; definition of multiple accounts in pools: definition of multiple accounts in a collective fund; multi-trader pooled index funds, etc.;

5. ability to actually pull sitting orders out of market center books, when a resting order would have executed through a credit limit, as bid/asked quotes change, and/or as an immediate last/next execution price would cause a resting order to be triggered;

6. enabling strategy trading where complete strategies wait to be executed within overall price and/or volatility parameters (and other forms of contingent orders), enabled by:

    a. the ability to place strategy trades into the RMU; and
    b. by having standardized trading strategy orders sitting on order books, and interacting globally with bids/offers and other orders of strategy trades; and, finally

7. use of pre-trade risk checks exclusively (either you catch the trade before it does damage or you are simply waiting for the disaster to happen) by accepting a systemic risk overseers grant to all of the same time-out to do the risk checking before the markets next move, thus enabling a "peak around the corner", that is what would happen to that account against its limits if that trade was executed ("shadow" execution).

It is important to understand what is possible so we aim for an industrial strength solution that is fit for the purpose of risk managing a global real time trading system.

Respectfully submitted,

Allan D. Grody, President
Financial Intergroup Holdings Ltd
169 East 69th Street
New York. NY 10021

Appendix

Financial InterGroup Research- The First Fifty Years

The first electronic markets became operational in 1969 when entrepreneurs saw the opportunity that technology allowed to bring together disparate investors in the equity block trading market and launched two services, Instinet and Autex. They operated at cps (characters per second) speeds, 30 cps to be exact. That was the speed a teletype machine ran at, typing out 30 characters (letters and numbers) a second. Even though electronic terminals by then had replaced the teletype (the Scantlin Electronics Corporation introduced the first electronic quote terminal in 1959, a blend of the telex price service, the news wire and the television), they still operated over teletype networks, thus having to run at those same low speeds. To their credit both services persist to this day albeit in different form, and certainly operating at higher speeds.

Complementing the technology applied to these first generation of electronic trading systems, and financial news and price dissemination networks was the development of electronic order placement mechanisms. Their information was first distributed via the character-per-second telegraph network, then the analog telephone network and now through all manner of digital networks. The first switched, order routing system was developed in the late 1960's on specialized communications switching computers, later generations were built on general purpose computers, offered by all hardware manufacturers.

With the capability now in place to route and return electronic orders to and from a central point, it was only left to computer application developers to mimic the matching algorithms of an exchange marketplace. The first such efforts took place at the Toronto Stock Exchange with the British Telecom Company of Canada in the early 1970's. It began pilots and prototypes that resulted in CATS, the first exchange-based central limit order system. Terminals were located both on and off the floor and supported multiple traders assigned as designated market makers.

At about the same time as CATS the New York Stock Exchange was automating their corporate bond market. This effort, begun in the late sixties, resulted in the first automated market developed by an existing exchange. Known as the Automated Bond System it was inaugurated in 1974.

During this same time conceptualizations of computerized markets abounded, first in cash commodities markets, then later in commodity futures markets, then in financial futures markets. Fast forward to 1981 when the system design for a completely electronic futures exchange was first proposed. After considerable piloting, two fully electronic futures exchanges were launched in 1985: Intex in Harnilton, Bermuda, and the New Zealand Futures and Options Exchange. These exchanges represented a radical shift in thinking about exchange automation. For the first time an entire exchange was to be created (in the case of Intex) or replaced (in the case of New Zealand) by automation. The concept of black box trading was born.

Latency and co-location issues were already apparent back then. The distance factor of closeness to the exchange was highlighted when traders using the local Bermuda terminals were always besting Chicago or New York traders who had orders communicated through a series of networks to get to the login on the main trading computer in Bermuda. These issues are still with us today, although the debate is focused on milliseconds (1/1000th of a second) and nanoseconds vs. multiples of seconds.

“Speeds and feeds” are really the only thing that has changed – individual products operate on price and quote dissemination networks that process millions of messages a second; latency is at 12 microseconds at one million messages per second vs. the old standard of 3 seconds per order receipt at the trading engine; and order-execution round turn capacities peak as high as half million per second and have gone to under a single millisecond vs. the old “standard” of 30 characters per second.

Risk management has not changed much either. Risk management was an after-the-fact process even though the Intex exchange interfaced directly with the clearing house where trades where guaranteed by the same clearing firms that guaranteed the traders executions. Direct Access was common, actually the norm back then. Proprietary traders were given limits by their trading supervisors, overseen by the credit department. Client access and limits were determined in reviews performed at account opening time, when credit officers went over financial reports and relevant regulatory data. Trade “blotters” where manually posted as the means of recording trades, and checked off by indicating the executed price, or crossed off if that was the final disposition. Orders remaining overnight in order books across markets were reconciled each day. The next morning clerks were busy validating the trade blotters against the next day’s computer generated reports that valued their trades against those limits. Clients who used the trading firms’ access had a similar procedure to go through, duplicated by the guaranteeing firms’ personnel, and reconciled before the start of trading the next day.

Firms who use Direct, Electronic Market Access (DEMA) today either join the exchange as a non-clearing member or access the exchanges in the name of a clearing member who guarantees their trades. In all cases, DEMA firms must be guaranteed by an FCM or prime broker or clearing firm (collectively the” guaranteeing firm”) before the exchange grants direct access to these firms. Because the firms do not send orders through the guaranteeing firm’s trading infrastructure, they are not subject to the pre-trade risk controls generally in place at these firms. The only real risk management capabilities guaranteeing firms have for DEMA customers is to carefully review a DEMA firm's own risk management process and systems before agreeing to clear and guarantee the business. Even with the most thoughtful risk management systems in place today, it may not prevent an errant trade in an electronic exchange from bringing down the house. The possibility that an algorithm in a black box trading system might contain a programming error such that it automatically resends the same order is entirely possible.

There are various methods exchanges and clearing firms have to manage real-time trading risk. However, none of these methods are precise enough to manage risk even within their own spheres of trading influence; certainly only minimally capable of monitoring their clients’ total risk limits and exposure across all the markets they may trade in; and none of them capable of protecting DEMA firms from themselves, or from protecting their own firms from the risk of their trading excesses or accidents causing them unrecoverable harm. That is not to say that the industry hasn’t made herculean attempts at risk management over trading systems using advanced technology.

The first use of using technology for risk analysis was in the early 1960's when computers, then the first generation of all transistor-based mainframes, were used to calculate margins for futures contracts, then individual stocks, then options. After that, it got more complex, with options and equity portfolios, then options and futures, and eventually all manner of combinations of futures, options and securities, now referred to overall as portfolio margining. Brokers and dealers collected these margins from customers to protect against market downturns creating defaults of customer obligations. In turn, each had to put up its own margin with clearing firms that, in turn, posted margin collateral with a centralized clearing house. Acting to mutualize the risk of any one customer or firm from defaulting, these clearing houses came to be insurance collectives of only the largest clearing firms, guaranteeing each other from loss through a capital fund and layers of insurance.

Further innovation came in utilizing the vast data-crunching capabilities of large databases of historical price information emanating from equity and futures market centers. Where such data had not yet gotten automated, as in bond prices, ambitious academics and traders engaged in massive efforts to manually input the data so that they could back test theories of performance and risk. The 1980's junk bonds of Drexel Burnham Lambert were the first such set of back-tested products where future risks and returns were predicted from past data points. Over nearly five decades of advances, calculations progressed from batch processing overnight to instant processing, in what is now known as "real time.''

In 1987 the year of the famous "market break" when the stock market in the US tanked over 20 % in a single day, handheld devices had evolved from the portable calculators of the 1970's to infrared and radio-frequency-enabled palm-size computers which, in turn, would lead to smart wireless devices. These were used initially on options exchange trading floors, making risk calculations more mobile by calculating options prices and measures of changes in prices, time and volatility known as the "Greeks." These calculations were used by floor market makers to help hedge options trading risks on the fly. Later devices were able to interact with market data feeds on intersecting and interrelated assets and contracts and to calculate-in real time-opportunities to arbitrage prices amongst and between mathematically correlated stocks, bonds, exchange-traded funds, options, futures, option futures, indexes, swaps and baskets of cash and/or synthetically structured products.

In October, 1987 the US experienced a market crash not unlike today’s financial crisis, a contagion of interconnected markets and interrelated cash flows arbitraged through mathematically driven strategies that crippled the exchange based US equity, futures and options markets. Cash flows between clearing houses, central counterparties, clearing firms, hedgers, speculators, dealers and investors were locked up as computers froze and trading halts were applied in ad-hoc fashion.

Brought on by a misaligned financially engineered product used to hedge market risk through a technique known as portfolio insurance, the 1987 market crash awakened regulators to the reality that they had no mechanism to aggregate and view the related transactions of all the trading parties across all these interconnected markets. A new causal variant appeared for the first time, the use of computerized mathematical models to arbitrage price discrepancies between markets. This technique, known as index arbitrage, was an early form of algorithmic trading. This was to be the first of many more mathematically driven contagions to come.

The 1999 Long Term Capital Management crisis was also created by over confidence in mathematical models left to run in real-time across globally connected markets. Relying on past correlations and a newly minted stochastic risk management theory of Value-at-Risk, this trading strategy nearly collapsed the known global economy at that time, precipitated by Russia defaulting on some of its debt. The industry driven rescue plan instigated by the Federal Reserve of New York prevented a disaster of near epic proportions.

The earlier 1987 market crash spawned many government, industry and private sector studies that led to the observation that the financial industry was driven by increasingly automated processes and interconnected through global communications networks. A project initiated at that time and lasting for nearly two decades, conducted by The Group of Thirty, a private think tank made up mainly of retired heads of state and central bankers, focused on eliminating risk in the interconnected financial system. In their 2006 final monitoring report the G-30 concluded that the implementation of reference data standards (data that describes financial market participants and their products) had proven difficult and that greater efforts by market infrastructure operators and international institutions with global reach would be needed to resolve this issue.

The G-30 statement would prove prescient when in 2008 the collapse of the global financial system, in part driven by loose mortgage underwriting standards and further seeded by financially engineered derivatives products, again exposed regulators to the lack of transparency from missing data and multiple identification standards. Differently identified mortgage originators, trading counterparties, and mortgages themselves, made an audit trail from product origination through to their securitization and placement in investment products across global markets impossible.

Beginning at the millennium, market trading centers became increasingly more electronic. In the United States, National Market System II rules and, in Europe, the Markets in Financial Instruments Directive gave birth to all manner of high-speed trading. First, it was enough to simply get a trade done without human hands or voices being involved. Later, it became a matter of getting to the execution facility's order book before the next guy. Direct market access to these executing facilities with limited credit limit checking became a way of eliminating delays in round-trip time.

Into this mix of an era of “speeds and feeds” came latency-busting co-location facilities, fiber networks, point-to-point laser networks and stream processing. All came together to provide the ability to process multiple data feeds in concurrent real-time streams, again to cut down on round-trip time. Further speed advantage was made possible by a new family of multi-core symmetric multiprocessors making multiple central processing units (CPUs) available to complete individual processes simultaneously. Clusters of multiprocessors made massively parallel processing possible within a single machine or across multiple machines.

Also becoming increasingly prevalent was asymmetrical processing, which uses separate specialized processors for specific tasks, like the Graphical Processing Unit (GPU) that moved from the video game district to the financial district. This allowed algorithmic traders to maximize latency busting communications networks and risk managers to price billions of instruments per second. These enhancements speeds up results for Black Scholes calculations for pricing of options, and for Monte Carlo simulations of risks in a trade or to recalculate the risks inherent in multiple portfolios of diverse assets.

The lack of data standards and the nature of interconnected markets again surfaced in the “flash crash” incident of 2010. Trades entered rapidly into the futures markets caused an overreaction of automated trading systems in the interconnected equity markets resulting in a nearly 1000 point drop in the Dow Jones average in a twenty minute period. It took nearly six months to reconstruct an audit trail of transactions across these markets to determine what had caused the problem.

The risks that these above cited incidents exposed the financial system to could have been mitigated if data and identification standards were in place to aid in traceability. In one case being able to identify a toxic sub-prime mortgage defaulted on in a tranche of a securitized bond sitting on a bank's balance sheet; and in another being able to identify the same trader and his or her trades, and the beneficial owner operating across different trading markets.

The problems that arose might have been more quickly resolved with a true picture of what had happened, or potentially what might happen, thus minimizing damage and recovering more quickly. In the best case computers monitoring markets and financial positions could have been proactive by activating early warning triggers that could prevent damage to the financial system. This is the lesson learned and the objective for regulators' interest in global data and identification standards that would facilitate the observation of both real time trading risk and longer term systemic risks building up across the global financial system. The contagion effect of both is what concerns us all. Regulators and industry members are equally focused on preventing another near collapse (or worse) of the global financial system

The global identification of financial market participants (the LEI initiative) and the products they own, trade and process (the unique product identifier (UPI) project) is the regulators' first recognition of the need for a mechanism to accomplish fixing the baseline infrastructure of the financial system. The unique trade identifier (UTI) is the mechanism for following the life cycle of a trade and thus providing a mechanism for observing financial transactions via automated means. Late in coming but necessary to create transparency, this global identification system will: allow regulators the ability to observe by computer means the financial institutions and markets they are mandated to oversee; allow over time the reengineering of financial institutions and the infrastructure utilities that support them; reduce risk and costs; and, finally, bring straight-through-processing to the financial supply chain.

Yet to be applied to finance are new federated data bases spread across the global internet that we see deployed in the intelligence community for massive data gathering, what is called BIG DATA applications. Slowly applications of this technology are finding their way into financial firms and in a limited way being explored by regulators.

BIO

Allan D. Grody, President, Financial Intergroup Holdings Ltd

I have been privileged over my career to have been on the team that designed and installed the first use of the US standard for identifying stocks and bonds, the CUSIP numbering convention; advised on the implementation of the first modern era global trading network; advised on the design of the first electronic futures trading system; with my colleagues at NYU conducted the first global survey of electronic trading markets; was a founding board member of the FIA's Technology Committee; designed the first internet based financial website; provided expert advice on a number of landmark futures trading system patent cases; taught risk management systems at the Stern Graduate School of business at NYU; founded the Financial Services Consulting practice of Coopers & Lybrand, now PricewaterhouseCoopers; and consulted to many options, futures and equity exchanges, and their clearing organizations. I am now an Editorial Board member of the Journal of Risk Management in Financial Institutions; on the Blue Ribbon Advisory Panel to the Board of the Professional Risk Managers International Association (PRMIA); am the Advisory Board Chairman of the European-based Financial Industry Ontology, Risk and Data (FIORD) initiative; and advise the Financial Stability Board on both their Global Identification initiative and their Swaps Data Repositories Data aggregation initiative.