Trading Infrastructure graphic…
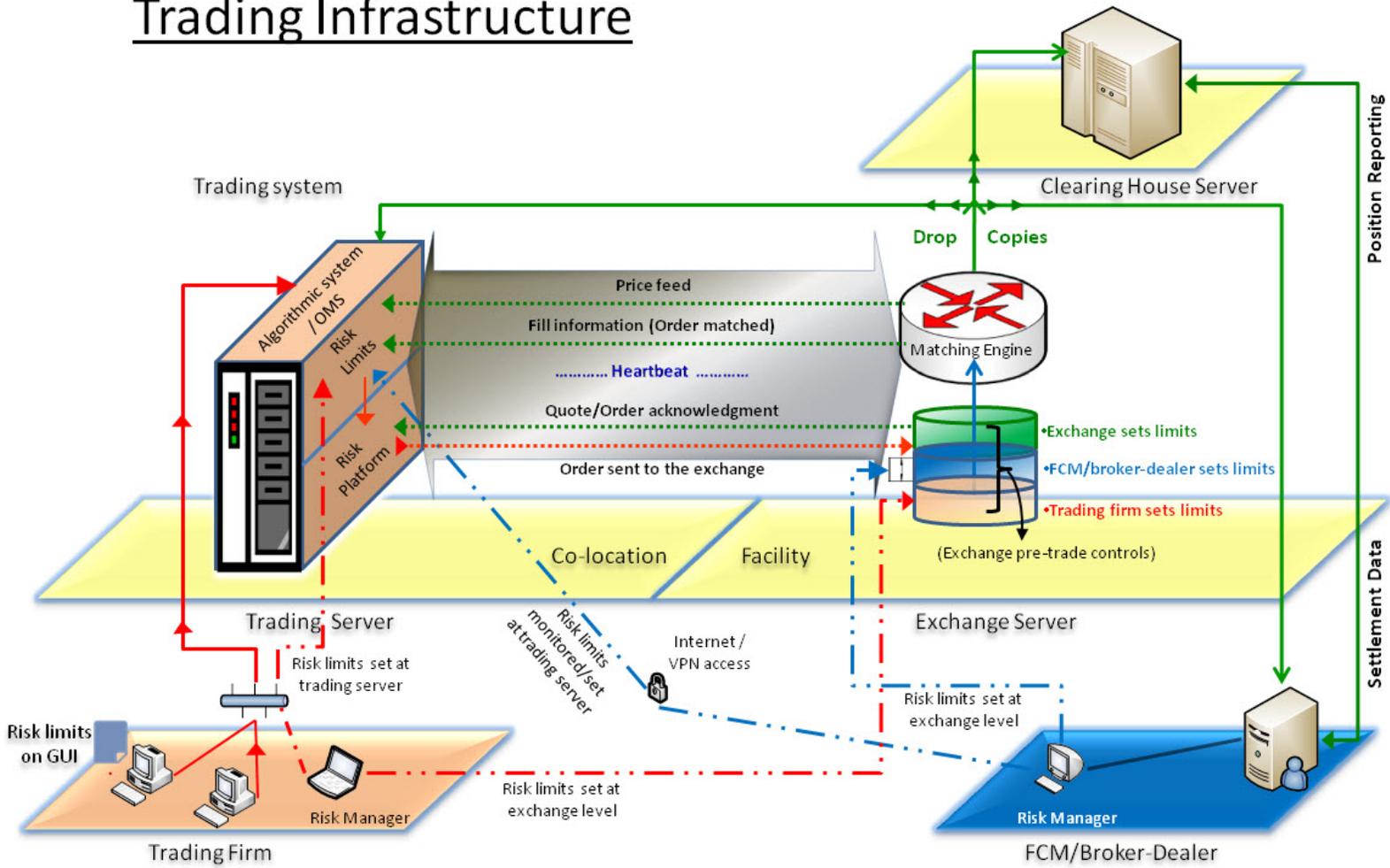

Source: Federal Reserve Bank of Chicago

Background

This graphic represents the levels at which risk controls may be set for trading firms that access the markets directly. The graphic shows a stylized model of one trading system accessing one exchange.

Each level of the trade life cycle – from order execution to clearing and settlement – is depicted. This includes the trading firm that is accessing the markets directly, it's clearing broker-dealer (B-D) or futures commission merchant (FCM), exchange, and clearing house. The graphic also depicts a co-location facility.

Levels of trading infrastructure:

1. Co-location Facility

Co-location facilities typically host servers for trading firms, B-Ds/ FCMs, exchanges, telecommunications providers, and data vendors.

In the graphic, the co-location facility houses:

- **Exchange server**(s) where pre-trade risk controls may be established for every order before it is routed to the trade matching engine where buy and sell orders are compared. Risk controls on the exchange server may be set by:
 - The exchange
  - B-D/FCM
  - Trading firm
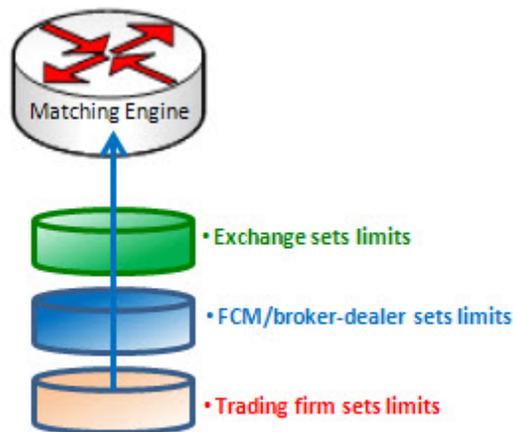
Not all trading venues offer functionality to B-Ds/FCMs and trading firms to set pre-trade risk controls and/or limits on the exchange server.


- **Trading server** that contains a **trading system** built by a trading firm (proprietary) or by a vendor. The diagram depicts a single trading server although co-location facilities house servers for multiple trading firms and B-Ds/FCMs.
  - The **trading system** may contain:
    - <u>Algorithmic/Order management system (OMS)</u> – A system that runs pricing model(s) and routes orders to a desired trading venue.
    - <u>Risk platform</u> – where p*re-trade risk limits/checks* are performed before forwarding an order to the exchange.
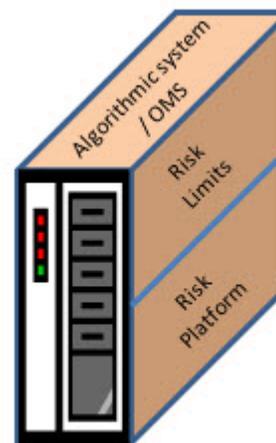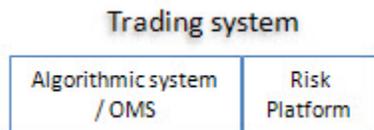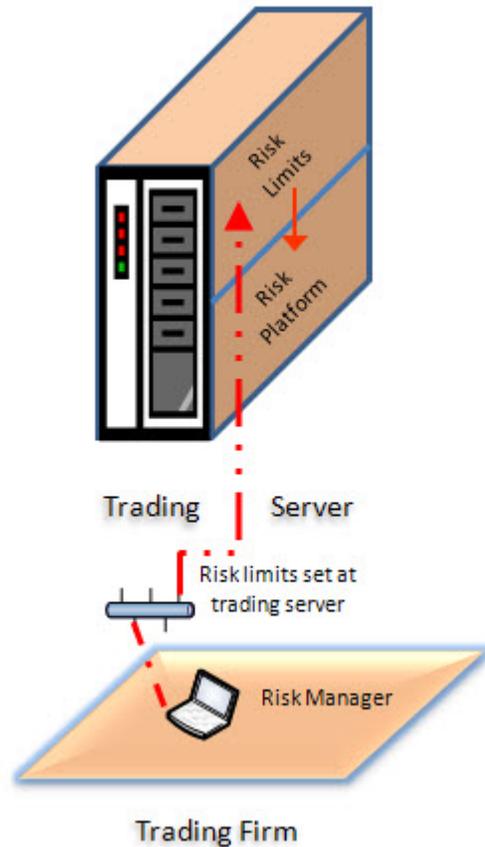
2. Trading Firm

Depending on the trading firm, **risk managers** control exposures to individual traders and/or trading groups and/or the overall firm by:

- Setting risk limits on the risk platform on the trading server.

Risk Limits

Risk Platform

Trading | Server

Risk limits set at trading server

Risk Manager

Trading Firm

- Using functionality provided by the exchange(s) that enables them to set risk limits on the exchange server. This functionality may be mandatory or optional or may not be offered at all, depending on the exchange.

Exchange Server

Risk limits set at exchange level
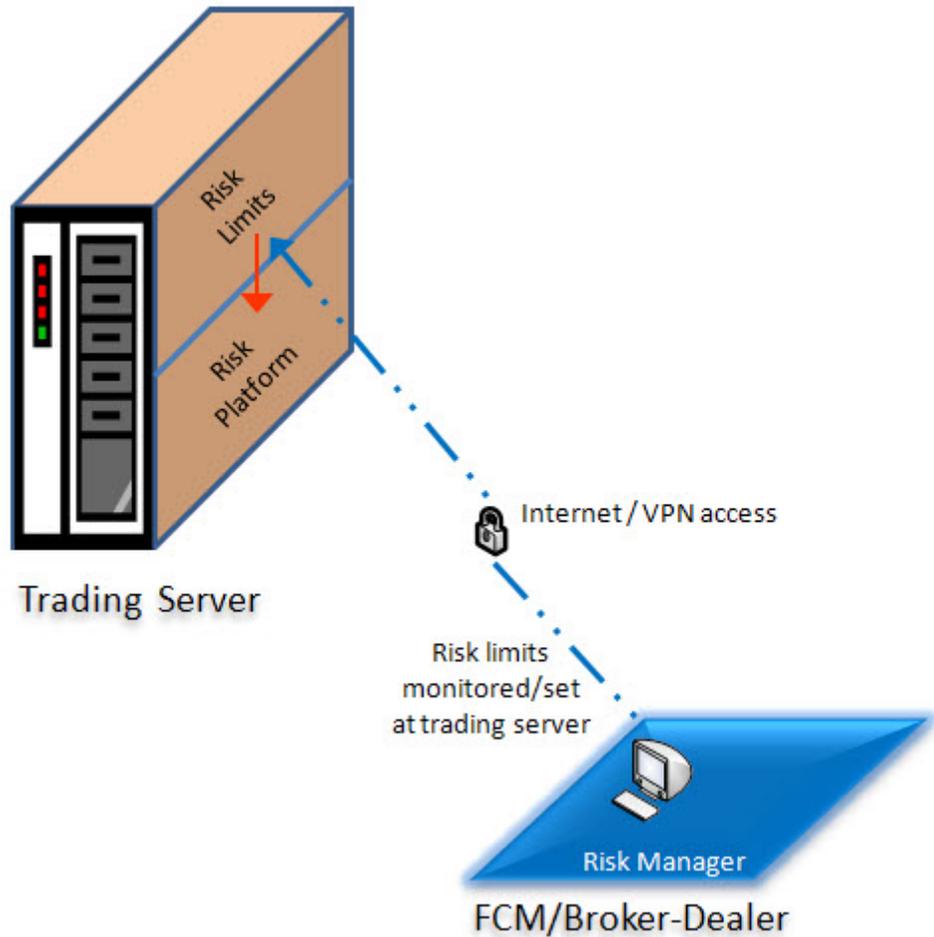
Risk Manager

Trading Firm
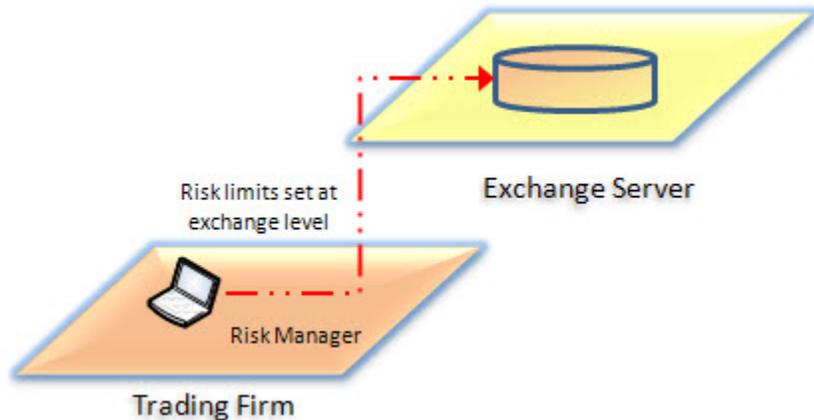
Individual traders and/or trading groups may also set risk limits on their own client systems (on the graphical user interfaces - **GUI**) below those established by the risk manger.
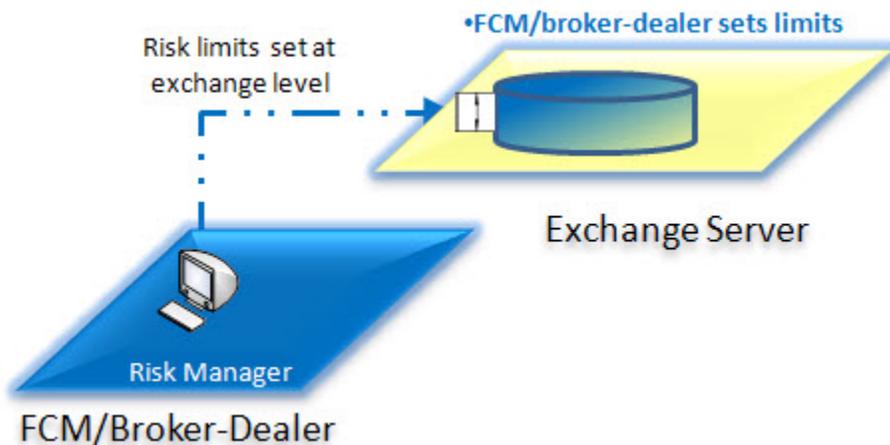
Risk limits on GUI
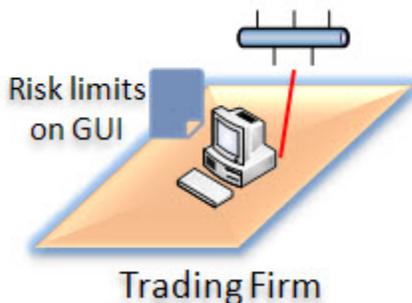
Trading Firm

3. Broker-Dealers/Futures Commission Merchants

Clearing **B-Ds/FCMs** may manage the risks of trading firms that access the markets directly in one or more of the following ways:

- Remotely accessing the trading firm's server at the co-location facility and checking whether the trading firm has established risk limits on that server.

Risk Limits

Risk Platform

Internet / VPN access

Trading Server

Risk limits monitored/set at trading server

Risk Manager
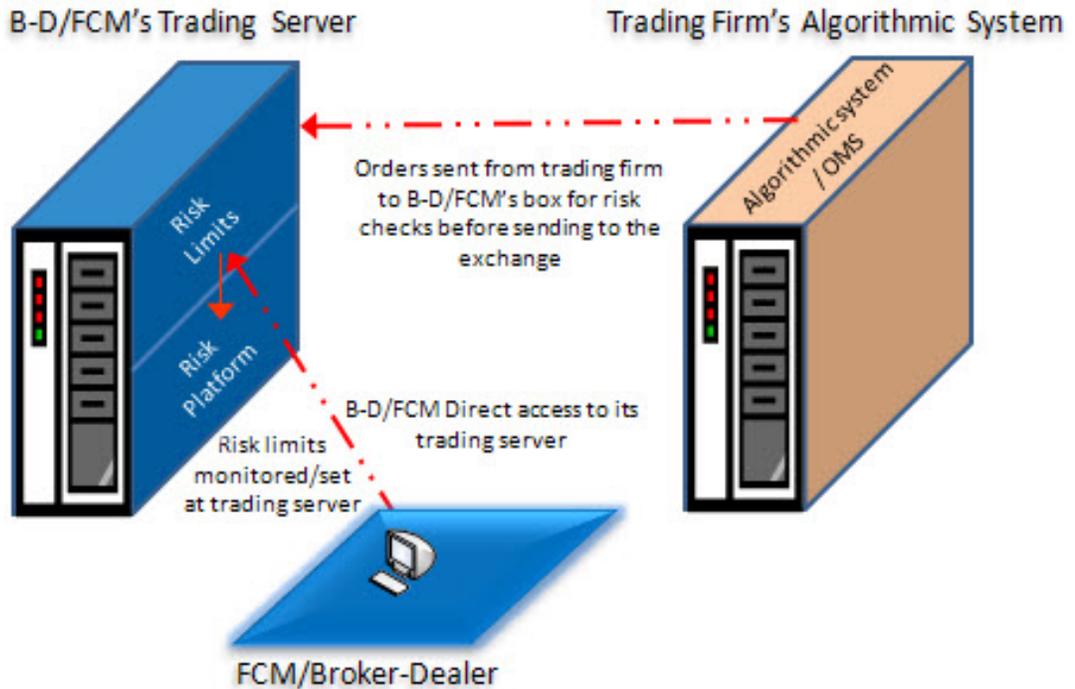
FCM/Broker-Dealer

- Using functionality provided by the exchange that enables them to set risk limits on the exchange server. This functionality may be mandatory or optional or may not be offered at all, depending on the exchange.

Risk limits set at exchange level

•FCM/broker-dealer sets limits

Exchange Server

Risk Manager

FCM/Broker-Dealer

- Relying on risk checks set by the exchange on the exchange server.

•Exchange sets limits

- Setting risk limits on the B-D/FCM's own trading server at the co-location facility and requiring its customers that access the markets directly to connect to this server(s).

B-D/FCM's Trading Server   Trading Firm's Algorithmic System

Risk Limits

Orders sent from trading firm to B-D/FCM's box for risk checks before sending to the exchange

Algorithmic system / OMS

Risk Platform

Risk limits monitored/set at trading server

B-D/FCM Direct access to its trading server

FCM/Broker-Dealer

4. Exchange

U.S. exchanges typically establish pre-trade risk checks on their servers and subject all orders/quotes against these limits before they are sent to the matching engine. Some exchanges also offer functionality to B-D/FCMs and trading firms that access the markets directly to set limits below those established by the exchange.

Matching Engine

•Exchange sets limits

•FCM/broker-dealer sets limits

•Trading firm sets limits
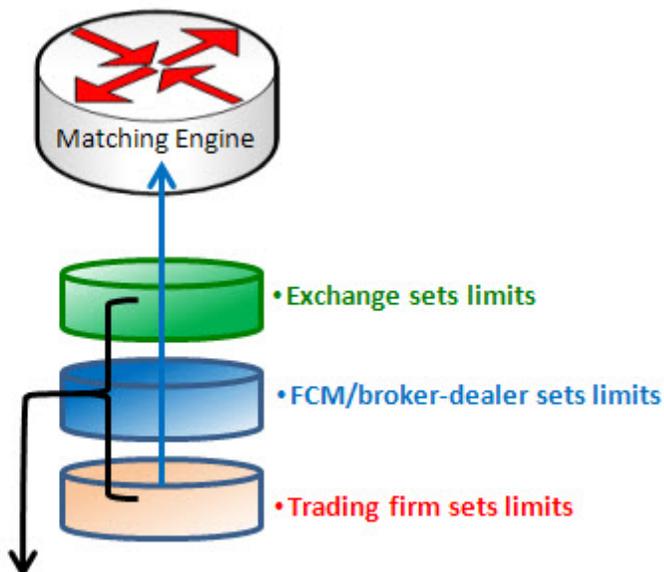
(Exchange pre-trade controls)

5. Clearing house

Clearing houses issue settlement data (pays/collect information) to each clearing B-D/FCM, which captures trading activity for the B-D/FCM's house and customer accounts. The frequency of clearing house calculation and monitoring of intraday exposures of clearing members is based in part on the frequency with which they receive up to date matched trade information from exchanges.