Screen-Based Trading Systems for Derivative Products

Technical Committee of IOSCO

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Introduction

The Technical Committee of IOSCO directed Working Party 7 to consider the issues surrounding screen-based trading systems for derivative products and to present conclusions on its work at the June 1990 meeting of the Technical Committee in Montreal. To carry forward the work on this portion of the mandate, the Working Party established a Subgroup consisting of representatives from France, Switzerland, the United Kingdom, and the United States.

The Working Party agreed to limit the scope of the inquiry of the Subgroup to only those screen-based trading systems that:

(1) conclude or execute a legally-binding transaction,

(2) are non-proprietary (i.e., not operated by an individual intermediary), and

(3) trade derivative products.

For purposes of this paper, the Working Party agreed to use the term derivative to refer to those products in which the market itself is the issuer, which are subject to the rules of the issuing market, and for which a clearing organization is used to settle profits and losses, make deliveries, and guarantee cleared trades.

In addition to electronic trading systems which use a trade execution algorithm, there are at present a number of trading systems which provide a billboard (i.e., announcements of bids and offers) to facilitate later negotiation between interested parties. Such systems are not within the scope of this paper.

The Working Party suggested the following areas of emphasis: access, response times, capacity, liquidity, financial integrity, interface with

clearing, audit trail, vulnerability (including security), algorithm performance, market fragmentation, and price transparency. The Subgroup refined the issues referred to it to include:

(1) transparency,

(2) order execution algorithms,

(3) operational issues,

(4) security and system vulnerability,

(5) access,

(6) financial integrity,

(7) surveillance,

(8) disclosure, and

(9) the role of system providers.

The Subgroup did not attempt to address the difficult task of defining a market.

This paper discusses each of these topics and articulates for each a broad principle which can assist relevant regulatory authorities (for a definition of this term see p.4), in the provision of regulatory oversight of screen-based trading systems. In drafting the Principles, the Subgroup drew upon supervisory and practical experience from a range of countries. The Principles are intended to provide general guidance to system developers and regulatory authorities in addressing areas of common concern. The relevant regulatory authorities will, however, have to analyze each specific system individually in light of the applicable legal standards, regulatory policies, and/or market custom or practice where relevant.

The Principles are intended to be consistent with the overall framework of analysis regarding the trading of derivative products that is being

developed generally by the Working Party. The broad objectives of regulation remain financial integrity, fairness, and market efficiency, whatever the trading system employed. The Subgroup has analyzed screen-based trading with these broad regulatory goals in mind, sought to differentiate and identify those aspects of screen-based systems that raise special concerns, and has drafted the Principles to reflect these concerns in the light of the general regulatory objectives.

PRINCIPLES FOR THE OVERSIGHT
OF SCREEN-BASED TRADING SYSTEMS
FOR DERIVATIVE PRODUCTS

The regulatory authorities responsible for oversight of screen-based trading systems for derivative products [1], whether governmental, quasi-governmental, or private ("relevant regulatory authorities"), should articulate the jurisdictional interest and supervisory principles applicable to the organizations responsible for the system such as an exchange ("system sponsor"), the organization or organizations which provides or provide the hardware, software, and/or the communications network and related services ("system providers"), the persons authorized to execute transactions on the system such as a broker-dealer ("system users"), and persons with financial exposure to the system ("system customers"). These principles should reflect the shared objectives of ensuring that, among jurisdictions, the levels of investor protection and regulation are adequate. [2]

To that end, it is suggested that jurisdictions adopt the following ten non-exclusive, general principles for the oversight of screen-based trading systems for derivative products which identify areas of common regulatory concern. It is understood that individual jurisdictions will take account of differences in national legal standards, regulatory policies, and market custom or practice in addressing these concerns.

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[1] For purposes of these Principles, the term "derivative products" refers to those products in which the exchange or market ("market") itself is the issuer, which are subject to the rules of the issuing market, and for which a clearing organization is used to settle profits and losses, make deliveries, and guarantee cleared trades.

[2] The Principles set out in broad terms regulatory considerations arising from cross-border screen-based trading, and not the specific concerns of some members in respect of the particular laws applying to their jurisdiction (e.g., those dealing with anticompetitive rules and practices, margin levels, or capital requirements).

1. The system sponsor should be able to demonstrate to the relevant regulatory authorities that the system meets and continues to meet applicable legal standards, regulatory policies, and/or market custom or practice where relevant.

2. The system should be designed to ensure the equitable availability of accurate and timely trade and quotation information to all system participants and the system sponsor should be able to describe to the relevant regulatory authorities the processing, prioritization, and display of quotations within the system.

3. The system sponsor should be able to describe to the relevant regulatory authorities the order execution algorithm used by the system, i.e., the set of rules governing the processing, including prioritization, and execution of orders.

4. From a technical perspective, the system should be designed to operate in a manner which is equitable to all market participants and any differences in treatment among classes of participants should be identified.

5. Before implementation, and on a periodic basis thereafter, the system and system interfaces should be subject to an objective risk assessment to identify vulnerabilities (e.g., the risk of unauthorized access, internal failures, human errors, attacks, and natural catastrophes) which may exist in the system design, development, or implementation.

6. Procedures should be established to ensure the competence, integrity, and authority of system users, to ensure that system users are adequately supervised, and that access to the system is not arbitrarily or discriminatorily denied.

7. The relevant regulatory authorities and the system sponsor should consider any additional risk management exposures pertinent to the system, including those arising from interaction with related financial systems.

8. Mechanisms should be in place to ensure that the information necessary to conduct adequate surveillance of the system for supervisory and enforcement purposes is available to the system sponsor and the relevant regulatory authorities on a timely basis.

9. The relevant regulatory authorities and/or the system sponsor should ensure that system users and system customers are adequately informed of the significant risks particular to trading through the system. The liability of the system sponsor, and/or the system providers to system users and system customers should be described, especially any agreements that seek to vary the allocation of losses that otherwise would result by operation of law.

10. Procedures should be developed to ensure that the system sponsor, system providers, and system users are aware of and will be responsive to the directives and concerns of relevant regulatory authorities.

PROLOGUE

Screen-based systems have a number of features which distinguish them from traditional floor-trading systems. Perhaps most prominent is the ability of a screen-based system to link directly market participants at remote locations without the need to route orders through intermediaries on an exchange floor. When the parties who have been linked in this manner are located in different countries, unique jurisdictional questions may arise.

Such linkages are possible because a screen-based system uses automated means to accomplish certain tasks that are otherwise performed by natural persons in a floor-trading system. This raises questions about how to adapt concepts and rules which were developed in connection with the direct person-to-person interaction of an exchange floor to situations where there is an automated intermediary. In addition, the question of the respective legal, regulatory, and financial responsibilities and obligations of the various parties involved with an automated system (e.g., system sponsors, system providers, system users, and relevant regulatory authorities) is a complex matter that cuts across all areas from operational capacity to surveillance.

As the foregoing illustrates and the remainder of this paper discusses in more detail, the advent of screen-based trading raises special regulatory issues. By articulating supervisory principles in advance, relevant regulatory authorities could help system developers in designing systems by identifying areas that may be of concern. Such information might aid designers in addressing these potential regulatory concerns at an early stage of system development thereby preventing the need to make changes later, when such changes would be more costly.

Further, screen-based trading systems facilitate extensions of trading hours, particularly where screens are placed in different time-zones from the

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system sponsor. Placing screens in different regulatory jurisdictions, however, can lead to overlapping claims of regulatory authority. At the moment, there are no internationally accepted mechanisms or regulatory models for resolving the problems likely to be brought about by such claims. Yet the importance of how this question is resolved is likely to increase as this type of trading becomes more widespread, and single systems link together two or more markets in different jurisdictions with screens in numerous other jurisdictions.

The four key components of a screen-based trading system that may need to be addressed include the system sponsor (<u>e.g.</u>, an exchange), the system provider, the system-user (<u>e.g.</u>, a broker-dealer), and system customers. In a screen-based system, each of these elements could be located in a different country.

The following issues may be relevant:

(1) the extent to which trading activities undertaken on screen-based trading systems, including trading through screens located in a different jurisdiction from the market, will be subject to the rules and practices of the system sponsor, and the extent to which system-users will need to fulfill membership and other requirements imposed by that system, including the approval by relevant regulatory authorities, to be allowed directly to execute transactions;

(2) whether the primary obligation to ensure the orderly conduct of business on and compliance with relevant requirements in cross-border systems should rest with a particular regulatory authority;

(3) whether the presence of screens in another jurisdiction may require the relevant regulatory authorities in such other jurisdiction to consent to business being conducted through such system and to modify or waive the applicability of local regulatory requirements;

(4) the extent to which demonstration that the system sponsor, system providers, and system users are subject to effective regulatory and self-regulatory programs in their home jurisdictions should be deemed to satisfy the regulatory interests or requirements of another jurisdiction;

(5) which elements or points of contact determine where the system's primary location or "home" is located;

(6) the applicability of and the regulatory interest in any choice-of-law agreements required to be signed by the system sponsor, system providers, and/or system users;

(7) whether the nature of the order execution algorithm used by the system has jurisdictional implications (e.g., priorities of execution in one jurisdiction being unacceptable in another);

(8) whether the relevant regulatory authorities and/or the system sponsor, system providers, and system users (if they, in turn, have customers) have appropriate procedures for handling complaints originating from outside the primary jurisdiction;

(9) what is the relevant authority with respect to system providers and which elements or points of contact assist in this determination;

(10) which activities of system providers, if any, require regulatory attention; and

(11) how to ensure the regulatory interests of relevant regulatory authorities are addressed on a continuing basis where there is a compliance failure in any affected jurisdiction.

Arrangements between the relevant regulators to ensure the existence of adequate cooperation, access to information and information exchange to address their respective interests would seem to be essential. Existing international regulatory cooperation has tended to rest on bilateral agreements, such as Memoranda of Understanding (MOUs), enabling the inter-jurisdictional exchange of regulatory and/or enforcement information for compliance, investigative, and related purposes. In the enforcement field, new legislation has been enacted or is being actively considered in some jurisdictions, to enable regulators to pursue enquiries on behalf of overseas authorities regarding violations of non-domestic statutes. These policies aim to facilitate the regulation of inter-jurisdictional trading by providing regulators in one jurisdiction with information about business conducted in another. They assist regulators in both jurisdictions to regulate markets within their jurisdictions and help to identify trading abuses across borders. Such agreements or comparable arrangements may need to be extended to address monitoring and compliance of systems that effectively cross borders.

Relevant regulatory authorities will want to make clear the scope of any information sharing arrangements, i.e., to identify what information will be available, and by what mechanism. Arrangements also should be made clear in advance to protect the confidentiality of shared information in appropriate cases, i.e., to prevent the public disclosure of such information. Where systems provide for cross access, multilateral arrangements may be desirable. Solutions to problems which can arise clearly place a premium on good cooperation between different relevant regulatory authorities.

In the absence of general consensus concerning jurisdictional issues, to the extent practicable, regulators should articulate their approach to jurisdiction, including specifying their regulatory interests to the extent possible and should support the enforceability of appropriate choice-of-law provisions.

PRINCIPLE 1

THE SYSTEM SPONSOR SHOULD BE ABLE TO DEMONSTRATE TO THE RELEVANT
REGULATORY AUTHORITIES THAT THE SYSTEM MEETS AND CONTINUES TO MEET
APPLICABLE LEGAL STANDARDS, REGULATORY POLICIES, AND/OR MARKET
CUSTOM OR PRACTICE WHERE RELEVANT.

Applicable Standards

Although screen-based trading systems may have the effect of introducing similar trading methods in different jurisdictions, there remain wide variations in domestic law and market custom or practice. For example, some jurisdictions have comprehensive and detailed statutory schemes in place for the regulation of derivative markets and products while others may have laws addressing only certain areas such as broker-customer relations. Similarly, some jurisdictions may rely primarily on governmental agencies while others may make extensive use of self-regulatory organizations. Additionally, market custom or practice may be of relevance in some jurisdictions while others will have more formal supervisory structures. System sponsors and system providers should be prepared to satisfy the relevant regulatory authorities that the system meets applicable standards. Technological innovation in the automation field is extremely rapid and tends to lead, not follow, applicable law. The relevant regulatory authorities ideally should seek to ensure that existing standards, rules, and policies are sufficiently flexible to allow technological innovation and to avoid unnecessarily constraining system design without infringing the basic goals of fairness, efficiency, and market integrity.

PRINCIPLE 2

THE SYSTEM SHOULD BE DESIGNED TO ENSURE THE EQUITABLE AVAILABILITY
OF ACCURATE AND TIMELY TRADE AND QUOTATION INFORMATION TO ALL SYSTEM
PARTICIPANTS AND THE SYSTEM SPONSOR SHOULD BE ABLE TO DESCRIBE TO
THE RELEVANT REGULATORY AUTHORITIES THE PROCESSING, PRIORITIZATION,
AND DISPLAY OF QUOTATIONS WITHIN THE SYSTEM.

Transparency

The term "transparency" refers to the extent to which relevant information is available in the system about open or unexecuted orders and completed transactions. Examples of the types of information that can be provided include:

(1) the price of the most recent transaction,

(2) the quantity of the most recent transaction,

(3) the time of the most recent transaction,

(4) the parties to the most recent transaction,

(5) the current best bid and ask prices,

(6) the quantity at those prices,

(7) the parties who placed those orders,

(8) the prices of bids and asks behind the best prices,

(9) the quantity at those prices,

(10) the parties who placed those orders,

(11) any requests for quotes in the system,

(12) the parties who placed those requests for quotes,

(13) the number of individuals currently logged-in to a particular market, and

(14) the identity of those individuals.

The degree of transparency may vary among screen-based trading systems. Regulatory objectives include achieving an adequate level of transparency and ensuring that the system does not inequitably discriminate among like classes of market participants (for example market makers may have more information than other system users) with regard to the availability of market information. Regulatory authorities should be satisfied that the system is capable of disclosing those types of information which it is designed to make

available and, conversely, that there are safeguards to preserve the confidentiality of other information, the disclosure of which is not intended.

PRINCIPLE 3

THE SYSTEM SPONSOR SHOULD BE ABLE TO DESCRIBE TO THE RELEVANT
REGULATORY AUTHORITIES THE ORDER EXECUTION ALGORITHM USED BY THE
SYSTEM, I.E., THE SET OF RULES GOVERNING THE PROCESSING, INCLUDING
PRIORITIZATION, AND EXECUTION OF ORDERS.

Order Execution Algorithms

A. Elements

The term "algorithm" refers to the set of rules governing the processing, including prioritization, and execution of orders which have been entered into a screen-based trading system. The term algorithm does not refer to the programs which translate those rules into computer instructions. In any given system, the algorithm could include procedures for determining for each transaction in a particular contract: (1) the identity of the parties, (2) the price at execution, (3) the quantity, and (4) the time at which the transaction occurs.

A review of the rules which have been transcribed in the algorithm is a key factor in assessing whether a proposed screen-based trading system would promote the broad objectives of fairness and efficiency common to all financial markets. This is because the algorithm performs the same function as trading rules in a floor trading system. Regulatory authorities should apply standards to screen-based systems just as they apply standards in the assessment of rules relating to floor trading systems. For example, the standard under the relevant regulatory regime might require "open and competitive" execution; this standard may be applied by those authorities to the algorithm for a screen-based trading system. By contrast, another regulatory standard might require that customer orders receive priority.

In reviewing an algorithm, the relevant regulatory authorities should consider the availability of information about current orders and transactions in the system. The information which is available to participants may vary; examples of relevant information are set forth in the discussion of transparency above.

Another area which should be reviewed is the degree to which orders are given an equal opportunity to obtain execution. A competitive algorithm can increase the potential that the pricing mechanism will reflect accurately prevailing market prices at any particular point in time, thus decreasing the potential for improper practices in relation to the execution of customer orders. However, in some instances the degree of order exposure potentially may compromise the efficiency and fairness of an algorithm. For example, systems which identify the party who places an order for execution potentially may facilitate the pre-arrangement of trades or the abuse of customer orders in ways which are not possible where the counterparty to the trade remains unidentified. In addition, identification of a party to an order may discourage such parties from using a screen-based trading system if they are reluctant to disclose their position in the market.

B. Examples

The following list illustrates a variety of algorithm approaches which are possible:

1. Matching - Price Priority

Orders are executed at the best prices, but the system does not grant time priority. Executions are allocated among all orders at the same price regardless of entry-time.

2. Matching - Price/Time Priority

Orders are executed at the best price first and, for orders with equal prices, according to the time of entry.

3. Matching - Price/Party Priority

Orders are granted priority according to price but among orders at the same price, priority is granted to a particular category of market participant. For example, public customer orders could receive priority

over members' proprietary orders, or, on the other hand, market-maker orders could receive priority over those of other participants.

4. Matching - Price/Quantity Priority

Orders are granted priority according to price but among orders at the same price, priority is granted according to quantity. For example, to encourage public participation small orders could receive priority, or, conversely, to encourage institutional participation, large orders could receive priority.

5. Matching - Price/Order Type Priority

Orders are granted priority according to price but among orders at the same price, priority is granted to a particular type of order. For instance, market orders could receive priority over limit orders.

6. Matching - Single Price

The maximum number of contracts possible are executed at a single market-clearing price. Such an algorithm would not necessarily have to be limited to the opening but could be employed periodically throughout the day.

7. Unilateral Counterparty Selection - Price Priority

Priority is given to orders at the best price but generally a party is able to select his counterparty from among those bidding or offering at that price. The party who made the original bid or offer would have no choice as to counterparty.

8. Bilateral Counterparty Selection - Price Priority

Orders are executed as described in 7 above, but, both parties must agree to execute the transaction with one another.

9. Counterparty Selection - No Priority

Parties select both price and counterparty. The algorithm executes orders which match as to price, quantity, and counterparty regardless of other bids and offers in the system.

Each of these algorithms can be varied as well by changing the types of orders which the system will accept. Some systems accept limit orders only while others may accept, among others, market orders or stop orders.

Screen-based trading systems may provide special procedures at the opening, the close, or following a temporary shut-down. For example, a system could employ an algorithm at the opening which is different from that used for the balance of the trading session. The relevant regulatory authorities should review any such special procedures in relation to applicable standards.

PRINCIPLE 4

FROM A TECHNICAL PERSPECTIVE, THE SYSTEM SHOULD BE DESIGNED TO
OPERATE IN A MANNER WHICH IS EQUITABLE TO ALL MARKET PARTICIPANTS
AND ANY DIFFERENCES IN TREATMENT AMONG CLASSES OF PARTICIPANTS
SHOULD BE IDENTIFIED.

Operational Issues

A. Response Time

Response time is the elapsed time between the transmission of a transaction from the system user's terminal and the receipt of confirmation from the host computer that the transaction has been accepted (or rejected due, for example, to a faulty command of the system user). The system sponsor should disclose the system's response time objectives. The need to ensure that response times are equitable for all like classes of participants (e.g., market makers) is more important, from a regulatory perspective, than the actual response time. Under usual circumstances, equal response time is a matter which can be monitored by the system sponsor. To the extent possible, the host computer, system user installations, the communication network, and the software should provide for equitable response times for all like classes of system users. Market participants (including system users and, when relevant, their customers) should be informed where equal treatment is not possible, and the extent of any lags; response times that are considered adequate by traders under normal market circumstances might be perceived as insufficient under extreme market circumstances. For example, where system user terminals are dispersed over a large geographical area, it may not be possible or may prove cost prohibitive to ensure equal response times. This difficulty may be exacerbated where parts of the same network are supplied and maintained by different communications carriers in various jurisdictions. In all cases however, the actual response times should be disclosed. Variations in response time should be identified and explained. The potential for random variations should be disclosed if they cannot be eliminated.

B. Operational Equality of Treatment

All system users should have equal ability to connect and to maintain the connection to the system. In evaluating the system in this respect, two factors should be taken into consideration: (1) the communication lines of the network and (2) the software of the system.

In many countries, the administration of communication lines is a governmental monopoly and remains mostly beyond the control of the system sponsor. In the case of a national screen-based trading system, these monopolies may provide a degree of equality of response time and certainty of access among system users. However, where a system crosses national frontiers and becomes subject to the control of different network authorities, the operation of the system becomes more complex.

As for software, it should be a continuing concern of the system sponsor - and consequently a regulatory authority's ongoing task - to verify that equitable treatment is accorded all market participants of the same class. The regulatory objective should be to ensure that all equivalent inputs (volume and order type) by system users are treated fairly and equally, so that, for example, order inputs of equivalent priority, as specified in documentation of the algorithm, are executed or processed on a first-come first-served basis.

C. Interfaces to Other Systems

Screen-based trading systems can interface to at least six other types of systems: (1) clearing houses, (2) back-office systems, (3) order-routing systems, (4) market information dissemination systems (i.e., quotation, price, and volume), (5) floor trading systems, and (6) other trading systems.

Since most, if not all, clearing house activities are automated, screen-based trading systems may seek direct links with clearing houses. The interface must ensure that whatever is sent by one side is properly received by the other side. The clearing house should be able to receive the messages from the system at the same speed as they are sent and vice versa. Additionally, system sponsors, users and administrators of interfacing non-trading systems should be able to ascertain that all messages sent by one party are received accurately and on a timely basis by the other party. Although these objectives are in the interest of both the system and the clearing house, they are significant concerns for the system sponsor and the relevant regulatory authorities.

Links also can be established with back-office systems. Such links can facilitate the crediting and supervision of customer accounts and the settlement of trades.

Screen-based trading systems also may be linked to automated order routing systems. Such links should be reviewed to identify potential vulnerabilities or inefficiencies created.

Links with quotation systems also bear review. Procedures should exist to ensure that no quotation vendor has an advantage over other vendors in receiving information from the screen-based system.

In some circumstances, an exchange may list instruments on a screen-based system for trading to commence or continue before or after normal market trading hours. In such cases, procedures must be established and disclosed to system users for moving open orders in an equitable way from the floor to the screen-based trading system and vice versa.

Screen-based trading systems provide the opportunity for links with other screen-based trading systems. The efficiency of such interfaces with respect

to capacity, accuracy and speed of transmission should be reviewed by each system sponsor and particular attention should be paid to the effects of such a link on the operation of each system's algorithm. Care should be taken to ascertain that transactions entered in the network of one system intended for execution in a linked system do not provide special opportunities for abuses of the rules of either system or breaches of the applicable law.

PRINCIPLE 5

BEFORE IMPLEMENTATION, AND ON A PERIODIC BASIS THEREAFTER, THE
SYSTEM AND SYSTEM INTERFACES SHOULD BE SUBJECT TO AN OBJECTIVE RISK
ASSESSMENT TO IDENTIFY VULNERABILITIES (E.G., THE RISK OF
UNAUTHORIZED ACCESS, INTERNAL FAILURES, HUMAN ERRORS, ATTACKS, AND
NATURAL CATASTROPHES) WHICH MAY EXIST IN THE SYSTEM DESIGN,
DEVELOPMENT, OR IMPLEMENTATION.

Security and System Vulnerability

System sponsors and the relevant regulatory authorities should ensure that the safeguards which protect a system against unauthorized access, internal failures, human errors, attacks and natural catastrophes that might cause improper disclosures, modification, destruction, or denial of service are reviewed. This review should include the physical environment, system capacity, operating system software, data integrity, access controls, systems testing, documentation, internal controls and contingency plans and other safeguards which require incorporation into the design of the system. The review should be objective; many members of the Working Party believe that to be objective a review must be independent. (That is, those parties responsible for the development and/or operation of the system are not the same individuals who conduct the review.) The purpose of such a review should be to identify vulnerabilities that may exist so that they may be evaluated and addressed prior to implementation of the system. To avoid inhibiting innovation the regulatory authority should develop guidelines for system review rather than standards of design. The following briefly describes areas which should be addressed in such reviews.

A. Physical Environment

The physical environment of the communication facilities and central computer data center should be inspected. In addition, a representative site housing system user terminals should be inspected. Relevant regulatory authorities should be satisfied with the adequacy of safeguards for the protection of each component of the system. The configuration of the system (that is, the main computer system and network) should be reviewed to identify potential points of failure, lack of back-up, and redundant capabilities.

B.   Capacity

The capacity of a system usually is defined in terms of the number of transactions the system can process per unit of time, e.g., transactions per second. Relevant regulatory authorities should be satisfied with the methodology employed to determine the adequacy of system capacity. The system sponsor should be encouraged to test on a periodic basis the capacity of the system to handle average and projected peak volumes.

C.   Operating System Software

Relevant regulatory authorities should identify the operating system software used to run the screen-based system.   All inherent weaknesses of the operating system software should be identified and any countermeasures taken to neutralize the known weaknesses should be described.

D.   Data Integrity

The screen-based trading system should preserve the integrity of data once entered into the system. The procedures associated with file handling and back-up and recovery should be reviewed.

E.   Access Controls

The controls and procedures to insure the identification and authentication of system user's terminals and users of the screen-based trading system should be reviewed (e.g., use of passwords and user codes and other means of ensuring that access is possible only through an authorized terminal by an authorized system user).

F.   Systems Testing

The systems testing process should be reviewed to ensure that all functions and subsystems (including the algorithm) of the screen-based trading system have been tested. The testing should include system operation and all interfaces to external systems such as those used for market information,

audit trail, surveillance, and clearing. Spot checking of test outputs should be included.

G. Documentation

The documentation should describe the system and its operation completely and accurately.

H. Internal Controls

The internal controls and procedures used to ensure the operation and security of the screen-based trading system should be reviewed. At a minimum, controls should exist for configuration management (e.g., planning for hardware changes), software changes (including separation of function procedures), problem identification, reporting and resolution, system start-up and shutdown, system restarts, and disaster recovery.

I. Contingency Plans

Relevant regulatory authorities should review contingency plans to respond to major failures or catastrophes. All screen-based trading systems bear the risk of system break-downs which are not limited to hardware failures. Failures can occur because of (1) hardware problems, (2) software deficiencies, (3) human errors, and (4) natural catastrophe.

Hardware failures may be less difficult to respond to than other types of failure. Maintenance, replacement and/or catastrophe back-up agreements with hardware vendors may assist in reducing the risk of hardware failure to a minimum. Many times, hardware problems can be resolved with additional hardware; however, adding such additional hardware may involve unjustifiable expense and overhead. A balance must, therefore, be struck between the risks of breakdown and the costs of minimizing those risks. Similar assessments are currently necessary for floor trading systems. For instance, an exchange may have back-up generators but not a second trading floor.

The software for screen-based trading systems will either be designed from scratch or existing software will be enhanced and tailored to local or other specific needs. In all cases, the potential for software deficiencies should be of particular concern and thorough testing procedures are necessary. In addition, where software development and/or enhancements use certain assumptions which prove inadequate, the system sponsor or system provider should have procedures in place to make prompt adjustments and corrections on a timely basis. It is imperative that all software programs are properly documented, that the documentation is available to the relevant authorities and system personnel and that the system sponsor or the system provider is staffed with persons with the skills necessary to handle software and other failures.

The design, development, manufacture, installation, operation and maintenance of screen-based trading systems are exposed to the risks of human error. As a result, the system sponsor requires adequate procedures to ensure that the impact on the system of any human error is minimal. (See also the discussion of supervisory issues in the background piece on surveillance.) As communication occurs by electronic messages and is highly impersonal, trading on screen-based systems isolates users from the system sponsor and its personnel. The system sponsor should ensure that there is adequate opportunity for dialogue between itself and system users.

Finally, any proposed alternate trading procedures which are designed to be used during or after a failure and before the full recovery of all of the components of the primary system is achieved should be clearly described. The treatment of orders in the system before the failure should also be described. There should be express agreement as to the allocation of liability for losses

resulting from systems failures. As discussed below, these agreements should

be described to system users and system customers, if any.

PRINCIPLE 6

PROCEDURES SHOULD BE ESTABLISHED TO ENSURE THE COMPETENCE,
INTEGRITY, AND AUTHORITY OF SYSTEM USERS, TO ENSURE THAT SYSTEM
USERS ARE ADEQUATELY SUPERVISED, AND THAT ACCESS TO THE SYSTEM IS
NOT ARBITRARILY OR DISCRIMINATORILY DENIED.

Access

Screen-based trading systems have the potential to increase the degree of direct access to a market well beyond that which is normally available on floor trading systems. For example, screen-based trading systems are not subject to the same physical limits in relation to the number of traders on the floor which exist in traditional trading systems. Also, unlike floor trading systems, screen-based systems permit system users in diverse locations to execute transactions without going through intermediaries on the exchange premises. (Of course, electronic systems can be established in which terminals are not distributed to members for placement at remote locations but remain under the control of the exchange at its central facility.) The time constraints generally applicable to floor-based systems do not apply and trading outside of normal business hours may be facilitated.

Standards for use of and access to the system (just as for floor based systems) will be of concern to the relevant regulatory authorities and the system sponsors. Such standards should be clearly articulated in order to ensure that access to the system is not denied in an arbitrary or discriminatory way.

Relevant regulatory authorities should seek to ensure that any increase in access does not threaten to disrupt the orderly operation of the screen-based market or any related floor or cash markets. They should be satisfied that the operation of the screen-based trading system does not diminish existing standards or levels of customer protection. Increased access raises the following concerns:

(1) access should be restricted to adequately trained system users who have demonstrated competence in the functions they must perform;

(2) access should be restricted to users adequately vetted as to authority, integrity and fitness;

(3) consideration should be given to whether qualification standards should differ for different categories of users, e.g. those doing proprietary business versus those doing customer business;

(4) brokerage firms and relevant regulatory authorities should make arrangements for, and devote sufficient resources to, the adequate supervision of access to the system, and the activities of all authorized users and other operators;

(5) the relevant regulatory authorities should make adequate arrangements for, and devote sufficient resources to, the monitoring and enforcement of compliance with access and use restrictions;

(6) adequate arrangements should be in place governing the security of terminal locations; and

(7) in cases where a number of markets and their products are linked and accessible through a single screen-based trading system, adequate arrangements should be in place among the system sponsors and the relevant regulatory authorities, domestic and foreign, for the allocation of responsibility for the matters described above.

PRINCIPLE 7

THE RELEVANT REGULATORY AUTHORITIES AND THE SYSTEM SPONSOR SHOULD
CONSIDER ANY ADDITIONAL RISK MANAGEMENT EXPOSURES PERTINENT TO THE
SYSTEM, INCLUDING THOSE ARISING FROM INTERACTION WITH RELATED
FINANCIAL SYSTEMS.

Financial Integrity

Screen-based trading systems may increase financial risks by increasing access and extending trading hours. Such systems, however, also could provide an opportunity to reduce certain risks by decreasing the number of outtrades, providing a direct interface with the clearing system, and permitting credit controls or position limits to be programmed into the system.

A.   Potential Increases in Risk

The increase in the number of market participants with direct transaction execution capability which is possible in a screen-based trading system could create additional risks for clearing members and, ultimately, the clearing house. Further, a principal feature of screen-based trading is that it facilitates continuous 24-hour trading. This may imply greater trading volumes and an increase in the number of transactions executed when the banking and payments systems of the countries in which the transactions are entered or are executed are closed ("out-of-hours" transactions). Each of these developments will test the robustness of existing clearing and settlement systems. The relevant regulatory authorities must assess whether current financial resources requirements for clearing members and clearing houses are adequate to meet these financial risks.

1.   Clearing Procedures

An attraction of screen-based trading is that the global market for a contract can move from the dominant "domestic" location when that market closes to another time zone. But under existing arrangements clearing and settlement may continue to occur in the "domestic" market and the "domestic" currency. This has implications for the manner in which margin payments are effected, how daily net obligations can be settled, and the operating hours of the banking and payments system for the "domestic" market and currency. (This

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situation occurs now for evening floor trading and when trading and banking holidays do not coincide.)

In order to maintain the risk protections of the present clearing system which relies on intraday margin calls and the process of removing debt from the system on a daily basis, modifications may be necessary to accommodate 24-hour screen-based trading systems. Given the scale of business and the potential for large volumes of cross-border transactions, any resulting increase in credit risk may exacerbate systemic risk.

Among the possible responses to these risks include the establishment, by a clearinghouse, of an additional routine intraday settlement for contracts that are traded on an out-of-hours basis. Such a procedure could reduce the time between transaction execution and trade settlement to a shorter period than currently exists for floor trading.

Another response would be to require higher initial margin requirements for out-of-hours trading. A clearing house could even establish differential margin requirements depending on the time zone of the system user or account holder. This would not expedite the collection of margin but would create a requirement to pay a larger amount thus cushioning any delays in rendering mark-to-market settlement.

Yet another response would be to make arrangements to accept collateral at foreign banks or to hold excess collateral at the clearing house to cover out-of-hours intraday margin calls. For example, a Chicago exchange could have an account at a London bank where it would accept gilts to cover intraday payments for the period of several hours until the U.S. banks open.

2. Payment Procedures

The ultimate test of a clearing and settlement system is the capacity to ensure payment of (net) obligations. Payment arrangements may be subject to additional pressures from screen-based trading systems. Although these pressures would exist under any 24-hour trading system and thus are not unique to screen-based trading systems, the relevant regulatory authorities reviewing screen-based systems should assess the extent to which appropriate banking arrangements are in place to address these concerns.

The testing of payment arrangements imposed by greater volumes of business is straightforward; less clear is the appropriate response to the potential increase in "out-of-hours" transactions and related concerns. Systems sponsors should establish when the trading day begins and ends. It may be helpful if relevant regulatory authorities could define, by agreement, the "trading day." For example, the trading day could begin at opening of business in the Far East, continuing through the European time zones, and ending at the close of business in a North American time zone. Another alternative would be that the trading day for each system would end at the close of the banking day in the time zone where the system sponsor is located.

Further considerations are the additional requirements which the increased volume of 24-hour trading and the capacity to link more closely settlement and payment could impose on banks involved in the clearance and settlement process. For example, arrangements may be necessary to accommodate the transfer of funds from traders to financial intermediaries to the clearing houses during hours when the banks normally would be closed. However, strictly interpreted, payment is not final until there has been a transfer across central bank accounts, i.e., central bank finality. Thus, in the case

of dollar transactions, eurodollar payment is not in itself final, and there can be no final payment outside the hours that the Federal Reserve System is open. The "perfect" solution to the problem of "out-of-hours" transactions would therefore be for central and commercial banks to operate on a 24-hour basis and to link with national and international fund transfer networks. This would, however, clearly involve significant cost and should be viewed as a longer-term consideration. Intermediate solutions to the problem of "out-of-hours" transactions, building on clearing houses' acceptance of less than final payment such as acceptance of finality agreements (i.e., settlement finality), seem likely to be the preferred response. For example, there are existing arrangements where the payment authorization of settlement banks involved in the clearing process are accepted as equivalent to final payments/transfers.

In seeking to offset additional credit risks, clearing houses might consider the adaptation of three existing practices. First, they could establish a system of local bank guarantees to cover "out-of-hours" trans- actions and associated payments effected outside the banking hours for the "domestic" currency (the currency of the "domestic" exchange). This system would in effect transfer the clearing houses' credit risk to the banks supplying the guarantees. The clearing houses would have to be certain that the banks would stand behind their guarantees; and the banks would in turn need to make their own credit risk assessments of the firms involved in taking positions "out-of-hours." The former would require considerable new work on the part of "domestic" clearing houses, and could require the establishment of banking relations in, potentially, several time zones. The latter would require banks to have considerable knowledge of the global trading strategies

and internal controls/limits systems of the firms for which they were asked to provide guarantees.

Second, clearing houses could accept payment in eurocurrency or the local currency of the system customer instead of the currency in which the contract is denominated or which is local to the marketplace. Acceptance of eurocurrency (e.g., eurodollars for transactions conducted in Japan outside banking hours) would be acceptance of payment across clearing bank accounts without final central bank payment. Payment in the form of currency local to the customer would be central bank final, in that it could have passed through the local central bank accounts. Either procedure, however, would leave the clearing house exposed to foreign exchange risk.

Third, a clearing house could make arrangements with its existing banks to have officers available to provide irrevocable commitments outside banking hours. These settlement commitments involve credit determinations by the banks to make payments in same-day funds on behalf of those clearing members for which they maintain accounts. These commitments can be relied upon by other system participants. Payment actually occurs when the central banking system opens later in the morning.

Each of these three alternatives would require banks to take an increasing interest in their role in the clearing and settlement process.

B.   Opportunities for Risk Reduction

Screen-based trading systems will afford design opportunities to reduce and monitor risk not generally available to floor-based systems. For example, screen-based trading systems may be structured to eliminate or reduce outtrades. That is, such systems may provide that trade execution or

confirmation cannot occur unless the relevant data match on both sides of a trade. This feature could expedite clearing and settlement and reduce the financial risks incurred by brokerage firms in connection with carrying uncleared trades.

In fact, screen-based trading systems can be designed to interface directly with clearing systems. This could reduce risk by allowing market participants and relevant regulatory authorities to obtain position reports more quickly and, therefore, to assess risk exposure at an earlier point in time. Moreover, such an interface could permit the clearing cycle to be expedited, thereby reducing the length of time between trade execution and the margining of that trade. The interface and maintenance of its integrity could be more complex, however, where a clearing system is linked to more than one screen-based trading system or the clearing system is in a different jurisdiction from the system user.

Screen-based trading systems also could facilitate the automatic enforcement of compliance with individualized position limits or credit controls by programming such restrictions into the system. If properly designed, such features would enhance the effectiveness of existing credit providers and, therefore, the overall safety of the marketplace.

PRINCIPLE 8

MECHANISMS SHOULD BE IN PLACE TO ENSURE THAT THE INFORMATION
NECESSARY TO CONDUCT ADEQUATE SURVEILLANCE OF THE SYSTEM FOR
SUPERVISORY AND ENFORCEMENT PURPOSES IS AVAILABLE TO THE SYSTEM
SPONSOR AND THE RELEVANT REGULATORY AUTHORITIES ON A TIMELY BASIS.

Surveillance

A. General

There are three general issues that need to be considered in designing the surveillance features of a screen-based trading system: (1) what types of information should be collected; (2) what entity is to perform the actual surveillance functions; and (3) how surveillance information is to be shared among the relevant regulatory authorities, nationally and internationally.

Although screen-based systems may contain regulatory enhancements such as better audit trails and credit controls, such systems do not obviate surveillance and supervision. In addition, such systems may create the need for on-line access for surveillance purposes.

B. Information Collected

1. Trade Data

Screen-based trading systems should possess a complete audit trail capability, defined here to mean the ability to capture and maintain, for reconstruction of trading and analysis, the essential facts concerning each transaction effected in the system. In relation to a trade, these facts would include the instrument traded, the quantity traded, price, time, identity of the executing brokers, identity of clearing parties, and an indication of the type of account (e.g., principal/agent) for which the transaction is effected. Where the transaction is a quotation or inputting of an order, the essential facts would include the identity of the party inputting the quotation or order, the identity of the party legally responsible for the quotation or order, terms of the quotation (price and size) or order (buy/sell, market/limit, quantity), and time. The system should maintain such records for all orders, including cancellations and modifications. Ideally, data should be captured on a "real-time" basis, or as close to the actual time of

the transaction as possible without unduly encumbering the quotation, order, or trade processes. This audit trail would be maintained by the system sponsor and/or the relevant clearing house.

The issue of whether existing rules and arrangements for recordkeeping and notification are adequate or whether screen-based trading introduces elements which require existing systems to be modified should be a matter of inquiry of system sponsors, system providers, and the relevant regulatory authorities. In this context, it is principally the immediacy of execution that generates regulatory concerns, together with the lack of an intermediate (floor) party. For instance, system sponsors and relevant regulatory authorities must recognize that trading by means of an electronic medium would cause electronic recordkeeping to replace traditional order slips. Electronic records also include computer-to-computer links from client to brokers; the ability to handle and retrieve information from such records must be considered. If such systems replace hard copy recordkeeping then regulators will need to have means of confirming that the information in the system is accurate, can be admitted as evidence under domestic law in relevant legal proceedings, is securely stored, and is accessible to all those, and only those, who require it.

Consideration also should be devoted to what information should be maintained by the system user in respect of orders inputted into the system, and as to what information should be provided back to the system user from the system or clearing house. System sponsors and relevant regulatory authorities should determine whether these records should be in any particular form (e.g., hard copy, electronic data), whether they should be maintained for a specific period, whether they should be accessible on-line, and whether originals or duplicates should be lodged for safekeeping with any other body. In making

these determinations, consideration should be given as to how the information can be used to assess whether a broker is trading within his financial resources, or trading within restrictions imposed for other reasons.

2. On-Site Surveillance

The elimination of the physical trading floor removes certain opportunities for fraud or bad practices which may exist in that environment. However, consideration needs to be given to other vulnerabilities as much more trading will occur in the "back office," and this may be one site where mechanisms might be particularly necessary to detect and prevent such practices. Regulatory authorities will wish to determine whether existing rules and regulations are sufficient to deter such practices and whether there are likely to be new practices which only a screen-based trading environment will generate. Relevant regulatory authorities also need to consider how to address these issues on an ongoing basis and to design their surveillance systems accordingly.

3. Large Trader/Position Information

Any marketplace, whether automated or not, should possess the authority and capability to collect and maintain, for analysis purposes, information concerning positions held by, and/or trades effected for, one person or firm (including persons or firms under common control) above a certain size. This type of information may be collected via separate reports to the appropriate regulatory authority and it may not be essential for an automated system to be designed to capture this information electronically. It may, however, be cost efficient to design screen-based trading systems to have this capability.

4. Financial Information

Whether the system is a trading system only or is a system which includes clearance and settlement functions, there is a need, as with non-automated

markets, to monitor the financial integrity of market participants. This includes monitoring:

(1) initial and continuing compliance with restrictions on access designed to ensure creditworthiness;

(2) the financial condition of different participants (e.g., participants, if any, acting as market makers and participants responsible for quotations displayed in the system); and

(3) the settlement obligations of clearing members.

System sponsors may choose to design systems to perform some or all of these functions. Where the system does not provide for this type of surveillance, it should be designed with a view to facilitating the independent surveillance of these matters by the entity responsible for such surveillance.

In addition, limitations on access to the system, both for clearing and non-clearing firms, a topic separately discussed, should be designed to ensure the financial integrity of the system. The system should be capable of monitoring continuing compliance with these limitations.

C. Surveillance Function

Generally, where self-regulation is used, the primary surveillance function will be lodged with the self-regulator. This means that real-time surveillance information should be provided to the self-regulator for purposes of performing on-line as well as post hoc analysis. Ideally, therefore, systems should be designed to provide the self-regulator with access to audit trail information on a real-time basis. Although it generally will not be necessary to enable the regulator routinely to obtain such information on a real-time basis, ideally the regulator should have the authority to do so to ensure effective surveillance.

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The surveillance function will rely upon automated, computerized surveillance systems and procedures. These systems should be capable of identifying unusual and significant volumes of transactions and, perhaps, particular market participants undertaking such activity which may suggest manipulative or other abusive trading activities. Although the trading system itself need not be designed to perform these functions, it should be designed to be able to collect and transmit information in a form which is compatible with the needs of the relevant regulatory authorities.

D. Information Sharing

Adequate surveillance of derivative product markets, whether automated or not, requires access to trade and financial information from the underlying cash markets, as well as from related derivative product markets. In addition, a screen-based trading system operating globally may need to satisfy discrete surveillance concerns of different national regulators. As discussed in the prologue the former concern can often be addressed by information sharing agreements among relevant regulatory authorities and procedures to access information relating to cash market positions on an as-needed basis. At this time, the needs of different national regulatory authorities only can be addressed on a case-by-case, system-by-system, basis. Although these issues tend not to implicate system design directly, a sensitivity to these issues at the design stage, and appropriate liaison between designers and regulators, may facilitate the implementation of satisfactory information sharing arrangements.

PRINCIPLE 9

THE RELEVANT REGULATORY AUTHORITIES AND/OR THE SYSTEM SPONSOR SHOULD
ENSURE THAT SYSTEM USERS AND SYSTEM CUSTOMERS ARE ADEQUATELY
INFORMED OF THE SIGNIFICANT RISKS PARTICULAR TO TRADING THROUGH THE
SYSTEM. THE LIABILITY OF THE SYSTEM SPONSOR, AND/OR THE SYSTEM
PROVIDERS TO SYSTEM USERS AND SYSTEM CUSTOMERS SHOULD BE DESCRIBED,
ESPECIALLY ANY AGREEMENTS THAT SEEK TO VARY THE ALLOCATION OF LOSSES
THAT OTHERWISE WOULD RESULT BY OPERATION OF LAW.

Disclosure

Regulators generally require customers to be made aware of the risks associated with derivative products before they are allowed to open accounts to trade them. Screen-based trading systems may reduce some of the risks of trading in these products; they may also pose other unique risks of which customers should be made aware. For instance, because some systems may be completely order-driven and without any market maker obligations, a significant period of time could elapse before a "matching" order is placed into the system. Similarly, where the system does not provide a means to execute complex trades such as spreads, straddles, and boxes, customers could benefit from the knowledge that it may be considerably more difficult to implement such complex strategies, due to the uncertainty of the time of execution of all legs of the transaction.

In addition, screen-based trading systems, in contrast to exchange floors, rely entirely on the functioning of the automated system. Therefore, the impact of a system failure may be much greater in a screen-based trading environment. There should, therefore, be full disclosure of:

(1) the order execution algorithms of the system;

(2) any rules governing allocation of liability for losses from system malfunction or operator error;

(3) any difference in margin call procedures between transactions effected through a screen-based trading system and on an exchange floor;

(4) any limit order protections for system orders;

(5) the interrelationship, if any, between such screen-based trading sessions and exchange floor trading sessions;

(6) any provision for cross-exchange access; and

(7)   any choice of law provisions governing disputes arising in connection with trading in the system.

PRINCIPLE 10

PROCEDURES SHOULD BE DEVELOPED TO ENSURE THAT THE SYSTEM SPONSOR, SYSTEM PROVIDERS, AND SYSTEM USERS ARE AWARE OF AND WILL BE RESPONSIVE TO THE DIRECTIVES AND CONCERNS OF RELEVANT REGULATORY AUTHORITIES.

The Role of System Providers

Generally, markets are subject to well-defined regulatory requirements. Changing from a floor trading system to a screen-based trading system usually should not require major changes in the relationships between a relevant market (where it is a system sponsor or linked to a system) and its relevant regulatory authorities. If, however, a market contracts with an independent entity to provide certain key functions in connection with a screen-based trading system, existing law may not adequately provide for or address the role of this system provider. Relevant regulatory authorities should develop procedures to ensure that such system providers are responsive to regulatory concerns. Many of the issues raised in the prologue would be relevant in this connection.

In the first instance, the relevant regulatory authorities should continue to rely on their existing authority over the system sponsor. For example, the regulatory authority might direct the system sponsor to obtain from the system provider information in its custody which is relevant to the performance of the regulatory authority's responsibilities. The regulatory authority would be able to review the relationship between the system sponsor and the system provider and hold the system sponsor accountable for the responsiveness of its contractor.

In other cases, however, relevant regulatory authorities may need to develop procedures for dealing directly with the system providers. Conducting a review of computer security, for example, might require direct access to the system provider's facilities. Similarly, relevant regulatory authorities may wish to impose requirements relating to the use or disclosure of material and nonpublic information by employees of the system provider.

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