

**LEGCO PANEL ON FINANCIAL AFFAIRS**

**Meeting on 1 November 1999**

**“Progress of Migration of  
Hang Seng Index futures and options contracts  
to the  
Automated Trading System”**

## **1. Introduction**

- 1.1 In December 1997, the Board of Hong Kong Futures Exchange Limited (“Exchange”) decided that it was the appropriate time to commence the process to migrate HSI futures and options from open outcry to electronic order matching. In preparation for the migration, the Exchange and its Members have installed the necessary hardware, software and network, and conducted tests on the system. In particular, since the previous report on the progress of the migration to the LegCo Panel on Financial Affairs on 3 May 1999, nine simulation tests have been conducted with Members between 12 June 1999 and 11 September 1999.
- 1.2 During the ninth simulation test on 11 September 1999, a potential new error was identified. In light of the global Y2K freeze on software changes in the fourth quarter of 1999, the Board on 17 September 1999 voted to plan the migration of HSI futures and options from open outcry to HKATS after the Y2K freeze period, in early 2000. In the interim, two committees, namely, the Migration Business Impact Committee and the Migration Technical Committee have been established, and the Exchange is in the process of appointing an independent project manager for the migration. The Exchange also is working with OM Technology AB (“OM”), its software vendor, to add two enhancements to the system; a bulletin board for the display of complex strategy trades, and a pre-market opening mechanism.

## **2. Chronology of events leading up to the nine simulated tests**

### ***Background***

- 2.1 In April 1997, the Board of Directors of the Exchange decided it would best serve the Exchange’s and Member’s business development needs for all new futures and options contracts introduced on the Exchange to be traded in an automated environment. Further, the Board articulated its vision that the Exchange should become a fully automated marketplace, when conditions were appropriate. To realize this vision, it would be necessary to migrate the trading of HSI futures and options contracts from open outcry to an electronic order matching system.
- 2.2 In September 1997, the Exchange introduced trading of Red-Chip futures and options on its then automated trading system known as ATS. The introduction of Red-Chip products on ATS provided the Exchange with information and insight as to the acceptability of electronic order matching of equity index futures and options trading.
- 2.3 Based on this experience, the Board, in December 1997, decided that it was the appropriate time to commence the process to migrate HSI futures and options to electronic order matching and conducted a survey to assess Members’ views. Of the 118 Members who were actively trading HSI futures and options in December

1997, 113 Members responded to the survey, with 86 Members, or 77%, agreeing with the Board's view that the Exchange should take immediate steps to prepare for the migration of HSI products to electronic trading.

- 2.4 In making this decision, the Board understood that ATS was not sufficiently robust to trade HSI products, and that the system would need to be upgraded and enhanced before migration could be completed.

***Development and installation of the Exchange's automated trading system, HKATS***

- 2.5 Set forth below is a table showing the significant milestones in the development and installation of ATS and HKATS prior to the nine simulation tests conducted by the Exchange and its Members.

| <u>Date</u>       | <u>Event</u>  |
|-------------------|---|
| May 1998          | completion of hardware and network architecture design of the system  |
| July 1998         | completion of construction of a new "class A" data center on the 5 <sup>th</sup> floor of Asia Pacific Finance Tower        |
| September 1998    | completion of construction of a new electronic trading center on the 6 <sup>th</sup> floor of Asia Pacific Finance Tower    |
| November 1998     | installation of new electronic trading software (OM version 15.2) into the host system                                      |
| Mid-December 1998 | completion of installation of the communications network at 82 Members' offices   |
| Mid-December 1998 | completion of initial system functionality, failover, stress and integration tests  |
| End-December 1998 | completion of first round of system-wide simulated trading tests of OM software version 15.2, with 82 Members participating |
| January 1999      | use of the system with OM software version 15.2 as the electronic trading platform for the first street-wide Y2K test       |

|                                   |  |
|-----------------------------------|--|
| February 1999                     | completion of the second system-wide simulated trading test, with 91 Members participating   |
| March 1999                        | completion of the third system-wide simulated trading test, with 97 Members participating  |
| March 1999                        | use of the system with OM software version 15.2 as the electronic trading platform for the second street-wide Y2K test   |
| Early April 1999                  | completion of system functionality, failover, stress and integration tests and the fourth system-wide simulated trading test, with 109 Members participating   |
| Early April 1999                  | appointment of PricewaterhouseCoopers to assess the testing approach, the migration plan and the readiness of the system and OM software version 15.2 to handle the trading of HSI futures and options                 |
| 8 April 1999                      | establishment of the Migration Special Committee to address issues arising from the migration of HSI futures and options to an electronic system   |
| 12, 14 & 16 April 1999            | briefing sessions with Members on the overall HSI migration plan and proposed changes to the ATS system  |
| 19 April 1999                     | activation of OM software version 15.2 into production on HKATS for the trading of Red-Chip, HS100 and HKFE Taiwan Index futures and options, One-Month and Three-Month HIBOR futures, Stock futures and Rolling Forex |
| 24 & 26 May 1999                  | consultation sessions with Members on proposed amendments to the rules and procedures of the Exchange and the Clearing House in connection with HSI migration  |
| 9 June 1999                       | introduction of Hang Seng Properties Sub-Index futures and options contracts on HKATS  |
| 12 June 1999 to 11 September 1999 | completion of nine simulation tests with Members   |

### **3. The nine simulation tests and the work of the Migration Special Committee**

#### ***The nine simulation tests***

- 3.1 In preparation for the migration of HSI futures and options from open outcry to HKATS, nine simulation tests were conducted by the Exchange and its Members between 12 June 1999 and 11 September 1999.
- 3.2 According to the initial test design, a series of six simulated trading tests were to be conducted. The focus of the first two simulation tests was to be on the operational capacity of HKATS; the focus of the next two simulation tests was to be on the system functionality of HKATS; and the focus of the last two simulation tests was to be on strategy trading using the bulletin board. This initial test plan was subsequently modified and extended to nine simulation tests to address findings that arose in the course of the testing process.
- 3.3 A total of 104 Members participated in the test on 12 June 1999, which was divided into 5 sessions. The total number of deals executed in the 5 sessions was 31,653. This represented 2.04 times the historical high of 15,524 deals executed on 23 October 1997. The total number of contracts executed in the 5 sessions was 5,613,457, as compared to 93,265 contracts executed on 23 October 1997. Issues that arose during the test included instances of “out-of-virtual-memory” in Members’ workstations and unexpected delays in the updating of the Clearing Trades Window and the Price Information Window. A briefing session was held on 28 June 1999 to discuss the findings of the first test with Members.
- 3.4 The second simulation test was conducted on 3 July 1999. A total of 105 Members participated in this test, which was divided into 6 sessions. There were 47,392 deals and 4,845,908 contracts executed in these six sessions. Observations similar to those reported in the first simulation test were observed in the second test.
- 3.5 The third simulation test, which focused on both the functionality and operational capacity of HKATS, was conducted on 17 July 1999. In order to assure that meaningful data would be generated, and to avoid unreasonable price fluctuations and the input of exceptionally large order quantities, order placement guidelines were provided to Members. In addition, Members were requested not to execute more than 100% of their normal daily transactions, on a pro rata basis, during the functionality portion of the test. A total of 68,926 deals and 4,903,817 contracts were executed. However, the Exchange was not able to obtain meaningful data from the test, because order placement guidelines were not adhered to uniformly.
- 3.6 The fourth test, which also focused on the functionality and operational capacity of HKATS, was conducted on 24 July 1999. The test was divided into 4 sessions to simulate trade execution levels at 200%, 300%, 400% and 500% of a normal trading day. At least one director of each Member was required to be present to

supervise its employees during the test. 111 Members participated in the test. A total of 22,847 deals were executed during the test. While sessions 1, 2 and 3 were completed without significant problems, 60 Members reported that the intermittent information feed status of their workstations switched from “on” to “off”, and unexpected delays in information dissemination occurred in session 4 due to the excessive load placed on HKATS by test participants.

- 3.7 The fifth and sixth simulation tests, each divided into 2 sessions, were conducted on 31 July 1999 and 7 August 1999 respectively. The fifth test was designed to emulate market activity of HKATS at 2 and 3.5 times normal market activity levels, based on actual trading statistics during the first half of 1999. Following discussions with the SFC, the sixth test was designed to confirm the capacity of HKATS at 1.8 to 3.3 times the historical peak trading volume that occurred on 23 October 1997. In addition, to address issues that arose during the fifth test, it was decided that in the sixth test, the number of contracts per order would be limited to one; and that information in the order depth window would be provided on-demand rather than automatically, in accordance with the international standard used by other exchanges operating on OM software. No major problems or delays were reported during the fifth test on 31 July 1999. During the 7 August test, however, the intermittent information feed status changed from “on” to “off” for up to three minutes at 22 Members’ locations. This observation, known as “blacklist”, was due to malfunctions in the network. Upon reviewing the results of the 7 August test, the Board decided that it would be prudent to conduct additional tests on HKATS prior to migration. A meeting for Members’ directors assigned to supervise the seventh and eighth simulation tests was conducted on 19 August 1999 to review the test scripts and procedures for the seventh and eighth simulation tests and the results of the 7 August simulation test.
- 3.8 The seventh test was conducted on 21 August 1999 and was divided into four sessions. Following further discussions with the SFC, the test was designed to confirm the capacity of HKATS at 3 times the historical peak trading volume. In addition, the number of contracts per order again was limited to one, and the order depth window again was set for updates on demand rather than automatically. During this test, 24 Members reported system delays or disconnections caused by the malfunctioning of the order depth window. This was caused by the excessive resources required for workstations to sort the 400 best orders for all months and series within a “family” (HSI futures and options, combined, constitute a family).
- 3.9 The solution for this problem was a parameter change providing for updates of the 250 best orders on demand, in the month or series specifically requested. The sorting function also was reallocated from the workstation to the central system. Based on the identification of this problem and the proposed solution, the eighth test was conducted on 4 September 1999. This test was designed to confirm the capacity of HKATS at 3 times the historical peak trading volume. The number of contracts per order was again set at one for each of the four sessions of the test.

These test features and design were fully discussed with the SFC in advance. 111 Members participated in the test, and no major problems or delays were reported.

- 3.10 The ninth test was conducted on 11 September 1999. The design of the test was identical to that of the eighth test and was fully discussed with the SFC. 109 Members participated. This test produced a potential new error that appeared to Members as a lost communications connection. Members trying to perform transactions would receive error messages disallowing them. The system record showed that 55 workstations at 29 Member firms were affected by this potential new error.
- 3.11 As set forth above, problems experienced at various stages of the tests were rectified at subsequent stages, except for the potential new error that was observed on 11 September 1999. A meeting was held with Members on 14 September 1999 to review with Members the results of the 4 and 11 September simulation tests.

#### *The work of the Migration Special Committee*

- 3.12 The Board appointed the Migration Special Committee (“MSC”), comprising representatives from seven Member firms, and the Chief Executive of the Exchange on 8 April 1999. The terms of reference for this Committee called upon it to address issues arising from the migration of HSI futures and options from open outcry to electronic trading on HKATS, to propose amendments to the existing rules and procedures of the Exchange where necessary, to evaluate Members’ readiness for migration, and to propose the migration timetable.
- 3.13 Nine meetings were held by the MSC between 13 April 1999 and 31 May 1999. Recommendations on the functionality of the system and proposed rule amendments were made by the MSC to the Board. Two Members’ briefing sessions were conducted on 24 and 26 May to explain to Members the proposed rule amendments and obtain their views. The proposed rule amendments were approved in principle by the SFC on 19 July 1999.
- 3.14 Upon the request of the Board, the MSC met three more times on 2, 3 and 9 August 1999 to review and assess the business impact of the system performance and functionality issues that were identified during the tests, and their significance to the migration.
- 3.15 The MSC met again on 31 August 1999 to discuss various matters, including the business impact of performance issues that arose during the seventh test on 21 August 1999.

#### **4. The three conditions of the Securities and Futures Commission**

- 4.1 In August 1999, the SFC set forth the following three conditions to be satisfied by the Exchange before the SFC would consider granting approval of the migration of HSI futures and options to HKATS:

“First, the system capacity must be put to a test at a reasonably comfortable margin above not only the normal trading volume but also the peak volume. It is important that the parameters of the tests should be defined objectively and having regard to the most acute trading level and pattern experienced over a reasonable period of time including the most severe period of October 1997. The results must be carefully and accurately documented and recorded, and any remedial work such as upgrading the hardware and software must be done to the satisfaction of the Commission.

Secondly, any defects and problems with the functionality of the system identified during these tests must be carefully examined and well analysed, and their consequences on the market and individual users affected fully assessed. If it was considered that the migration should nonetheless go ahead notwithstanding these functionality defects and problems, clear justification must be given to substantiate the recommendation and the risks they might incur for the market and the traders must be clearly set out.

Thirdly, a satisfactory contingency plan in the event of system failures of different degrees after migration should be made a pre-requisite to the Commission’s approval for the migration even if the above two conditions are met to the Commission’s satisfaction.”

- 4.2 In addition, to the SFC’s three conditions, PricewaterhouseCoopers, the Exchange’s independent consultant, suggested that the “*Board ... must consider ... conduct[ing] ... two member simulation tests without errors of a material nature being encountered*”.

#### **5. The way forward**

- 5.1 In view of the potential new error that was observed on 11 September 1999 and in light of the global Y2K freeze on software changes in the fourth quarter of 1999, the Board on 17 September 1999 voted to plan the migration of HSI futures and options after the Y2K freeze period, in early 2000.
- 5.2 The Board also decided to form two new committees; the Migration Business Impact Committee and the Migration Technical Committee, in connection with the migration process and to appoint a project manager for the migration.

- 5.3 The first meeting of the MBC was held on 13 October 1999 to discuss, among other matters, the previous deliberations of the MSC and proposed enhancements to HKATS, including the pre-market opening mechanism.
- 5.4 The first meeting of the MTC was held on 15 October 1999 to discuss, among other matters, selection criteria for the project manager, outstanding technical and functionality issues and the system and network configurations of HKATS. It is expected that the MTC will make a recommendation on the selection of a project manager very soon.

## **6. The Exchange's commitment to become a fully electronic marketplace**

- 6.1 The Exchange continues to hold the view that conversion to a fully electronic marketplace is the key to its future growth and development.
- 6.2 In this regard, the Financial Services Bureau, in its "Report on Financial Market Review", issued in April 1998 stated in paragraph 4.76

*"In conclusion, we believe that trade automation is the right direction to which the Hong Kong securities markets including HKFE should move and supports the policy decision of the HKFE Board of Directors in April 1997 to introduce all its future products on the ATS. We also welcome the recent decision of the HKFE to migrate its HSI futures and options trading from open outcry to ATS."*

- 6.3 Furthermore, the Note tabled by the Financial Services Bureau to the Legislative Council Panel on Financial Affairs on 7 September 1998 containing thirty measures to strengthen the order and transparency of the securities and futures markets in Hong Kong, directs the Exchange to specify a timetable for the migration of HSI futures and options trading from open outcry to electronic trading in order to minimize confusion on order execution and possibilities of improper conduct on the trading floor.
- 6.4 Accordingly, the Exchange remains firmly committed to the successful migration of HSI futures and options from open outcry to electronic trading as a top priority, to serve the interests of its Members, the Exchange itself, and Hong Kong as an international financial center. Various Directors of Hong Kong Exchanges and Clearing have been fully briefed on the Exchange's migration plans, and complete information on the migration is readily available to the HKEC Board.