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WARSAW STOCK EXCHANGE

**CLEARANCE AND
SETTLEMENT
AUTOMATION ANALYSIS**

Draft Final

July 11, 1991

Price Waterhouse



July 11, 1991

Ms. Sandra Frydman
Project Officer, FSDP
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Department of State
320 21st Street, NW
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Washington, D.C. 20523-0018

Dear Sandra:

We are pleased to present the Draft Final Report, Warsaw Stock Exchange Clearance and Settlement Automation Analysis, prepared by a Price Waterhouse Team of Mr. Robert Dick, Mr. William Kirst, and Mr. J. Richard Breen. The objective of this engagement was to review the current systems of the Warsaw Stock Exchange and analyze the automation proposals in terms of short-term and long-term cost and efficiency.

We present for your review our findings, recommendations concerning possible next steps for action by USAID/Department of Treasury and the Government of Poland. Our information is based on interviews and an extensive literature review.

We appreciate the opportunity to be of service to you on this important assignment. Please feel free to call us if you require any further assistance.

Sincerely,

A handwritten signature in black ink, appearing to read 'J. Richard Breen', written in a cursive style.

J. Richard Breen
Financial Sector Development Project

cc: Mr. Timothy Frost, Financial Services Volunteer Corps



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¹Delivered in Separate form to AID/APRE/EM and the Department of Treasury, International Department.

EXECUTIVE SUMMARY

Background

The Warsaw Stock Exchange (WSE) officially opened with five listings on May 1, 1991. During the previous eighteen months, the Ministry of Ownership Transformation had received extensive technical assistance in the design and organization of the operations of the Exchange from the Société des Bourses Françaises (henceforth referred to as the SBF). The trading system has been designed based on that of the Lyon Stock Exchange. Clearance and settlement have been automated on a PC-based system using commercially available data base software. The depository function is completely manual. This phase is to be succeeded by a second stage in which a new and unique design of automated clearance and settlement, and depository, suitable for the expected growth of trading on the exchange, is to be presented for approval and acquisition by the WSE. At this time, the president of the WSE expects to receive only one proposal. That proposal being prepared by the Société des Bourses Françaises is expected to be presented on June 25, 1991.

The Ministry requested the assistance of an expert in clearance and settlement systems to help in the evaluation of the proposal or proposals being presented to the WSE. The United States Treasury, working with the Agency for International Development (A.I.D.), commissioned Price Waterhouse 's Financial Sector Development Project to provide this assistance.

The Price Waterhouse consultant, Mr. Robert A. Dick, commenced a two week stay in Warsaw on June 6, 1991. While in country, he worked with the Polish Ministry of Ownership Transformation and WSE personnel on the tasks listed below.

Mr. Dick was assisted in-country by Mr. William Kirst, the partner-in-charge of the Price Waterhouse Warsaw office. Both worked closely with the WSE and with Mr. Bill Joslin, Mission Director in USAID/Warsaw. This project was supervised by The Financial Sector Development Director Mr. J. Richard Breen, and Ms. Marguerite Kirst of the Price Waterhouse Office of Government Services (Washington) staff.

Scope of Work

The scope of work drafted and accepted by A.I.D. and the Department of Treasury, contained the following tasks:

1. Examine proposals available and assess the functions, cost, and speed of implementation.

2. Evaluate the Critical Analysis Feasibility Study presented by the Société des Bourses Françaises.
3. Review the current plans of the Stock Exchange.
4. Assess the hardware and software requirements to run the proposed system and the expansion capabilities for future growth.
5. Review the internal Warsaw Stock Exchange development plans to automate current clerical procedures.
6. Propose alternative solutions that will conform to international business and regulatory standards in terms of safety, efficiency and consistency.

Constraints

The Scope of Work assumed that both the proposal by the SBF, and the key people of the WSE would be available to assist the consultant in obtaining the required data, and for discussions of future direction and strategy. Unfortunately, several key people were absent from the country, and those that were available could only give very restricted time to the consultant. The absence of the head of automation activity of the WSE was most limiting. The SBF proposal was not available; indeed was not even due to be presented until after this project concluded.

Document Availability

Documents to assist in the analysis such as the SBF prepared "Critical Analysis", the Rules and Regulations of the Exchange and Depository, existed in the Polish or French languages and were translated into English through facilities provided by the local office of Price Waterhouse (These documents are contained in Appendices 2,7,9,19). The "Critical Analysis", prepared by the SBF team, outlines the key assumptions concerning expected trading volume, functions and hardware that could be used in any future system. It is important to note that this document does not include in the design parameters the need for regulatory reports. This is a serious omission, and should be corrected at the earliest possible moment.

In view of the absence of the proposals, the team did compile as much literature and documentation as possible. Documents to assist in the analysis were obtained through the Exchange. Most have been translated into English by Price Waterhouse and are available for review with this report. One priority document, the Rules and Regulations of the Exchange and Depository, was completed by the WSE on June 19th; an English translation of this document appears as appendix 2.

A Change in Strategic Plan?

Shortly after the consultant returned to the U.S., the Polish Ministry of Ownership Transformation announced its plan to distribute shares of stock in state owned industries to all adult citizens of Poland. While the details of this program remain to be worked out, it is clear that a scheme of this kind and magnitude will have profound consequences for the design and implementation of a trading system, clearance and settlement systems, and above all, a national depository. All of the previous assumptions concerning the volume which these various functions must be capable of handling must be reviewed anew. Certainly, the creation of 29 million new shareholder accounts, all of which must be maintained, kept up to date, reported on, dividends distributed, etc., must now be taken into account in the design of an automated system, including hardware, for the depository function. These design efforts should go hand-in-hand with the design and implementation of the share distribution scheme of the Ministry.

Summary of Work Accomplished

The Critical Analysis was used for discussions with the WSE staff on volume projections and analysis of the hardware configuration needed to process the number of transactions. The hardware vendor, IBM, was contacted and estimates of the main system processor and terminal requirements were reviewed. Preliminary costs were obtained and will be used to compare with the SBF proposal. The Critical Analysis contains a summary of Exchange requirements and can be used to invite proposals from other firms. These volumes however, do not take account of the effect of the plans of the Ministry of Ownership Transformation to create 29 million new shareholders of the stock of privatized industries.

At the request of the Department of Treasury and the Agency for International Development, the consultant turned his attention to assisting the WSE with a short term action plan for managing the automation of the current and expected exchange volumes competently. The actual hardware and software systems referred to later in this report as the "internal system" (i.e. designed internally) were reviewed, and future alternatives discussed with WSE personnel. These alternatives will provide the WSE with a competent system of clearance, settlement, and a depository, which is well within the capabilities of existing personnel, requires minimal new investment, and increases efficiency at current and projected volumes. This internally designed system, using existing software, could serve the needs of the WSE for at least the next year or eighteen months, if current projections of volume hold true.

These recommendations for better utilization and a more controlled environment for both the short- and long-term, are detailed in sections VII & VIII.

Recommendations

The WSE should:

1. Implement a thorough review of the assumptions which form the basis of a strategic plan to develop the operations of the stock exchange and depository.
2. Issue multiple invitations to bid: Once firm bases are established for the future direction of the exchange, the WSE should plan to issue an invitation to several firms to make proposals for an integrated trading, clearance and settlement system. The SBF proposal which is currently in preparation, can be compared to these proposals.
3. Integrate the Quotation System and the Depository: Develop the internal system to integrate the Quotation system and the Depository. The WSE should continue using the enhanced PC based system for the next year. Outside technical support should be contracted for to assist the development team in database and network evaluation for ease of development and efficient performance. Identify any limitations of the database software currently being used.
4. Conduct an Information Technology audit: An information technology audit should be done to verify the operating procedures and to develop back up and recovery standards for the system. An audit should also be made to formalize all Depository procedures and to protect the books and records of the Depository.
5. Develop the internal WSE system in the short-term: Implement the proposed internal automatic trading and settlement procedure presented in Section VII. Foxpro should be used instead of DBaseIV. Processing should be performed on an exception basis, eliminating a great deal of paper. The Quotation system should be modified to provide for multiple issues to be processed on single terminals. This will benefit the exchange by limiting additional hardware investment for new issues. Back-up and recovery plans should also be established.
6. Market the Exchange and brokers to the Public: The procedures of the Exchange and Depository, including the rules and regulations should be made available to the public. The Exchange must advertise the automated system to the public and build their confidence in the stock market.
7. Provide regulatory reporting: There are no reports currently being produced for regulatory purposes. The Securities Commission should provide their requirements to the Exchange.

Possible Next Steps for U.S./Government of Poland Action

From the examination and interviews conducted on this visit, it remains evident that the opportunity for joint United States/Poland projects is quite high. Based on our experience with capital markets development in other emerging markets around the world, we recommend that the automation needs of the Warsaw Stock Exchange be viewed in a larger context of the development of a securities industry as part of the capital markets. We offer below several ideas to further assist the development of the securities markets of Poland.

1. Provide expert consulting services to the WSE to assist in reviewing a strategic plan for the development of the operations of the exchange in the light of privatization plans, and to assist in evaluation actual proposals received in response to solicitation.
2. Technical assistance to the WSE should be provided on a continuous and consistent basis over the next eighteen months to two years. This technical assistance should comprise a securities industry specialist and an information technology advisor, plus some specialized short term advisory services.
3. Present an information technology audit plan with appropriate technical assistance provided.
4. Establish a training program for Exchange employees in all aspects of the securities business. This will require Technical Assistance by specialist trainers.
5. Provide technical assistance on drafting rules and regulations of the Exchange and Depository.

I. BACKGROUND

A. The Exchange

The Warsaw Stock Exchange opened for trading on the 16th of April in the building once occupied by the Communist Party's Central Committee. Currently the exchange is modelled after the French Bourse system, specifically the regional exchange at Lyon. The Warsaw Stock Exchange management has been receiving advice from the French advisors for almost one year. For their part, the SBF have been working with stock exchange personnel and have written a paper called "Computerization of the Warsaw Stock Exchange: A Critical Analysis", which projects volumes for the next two years and proposes using the French system with IBM hardware. A copy of the Critical Analysis is included as Appendix 7. Overview papers on the creation of the Polish Stock Exchange, and the Bill on Public Trading in Securities, is included in this report as Appendix 1 and 13.

Since its inception, the exchange has been owned by the State but is expected to soon be privatized. The Exchange was established by the Ministry of Ownership Transformation and was launched with a total capital portfolio of 60 billion Zlotys owned by the State Treasury. A 12 member Board of Directors was named with the Ministry appointing Dr. Wieslaw Rozlucski as its first President.

The brokers on the exchange are employees of the major banks in Warsaw. The banks also act as custodians for the shares owned by the broker's clients. Due to potential conflicts of interest, the clients must make clear distinction between their bank and brokerage business.

The current staff of the exchange includes five people in the Information Technology Dept. They implemented the Quotation System which currently drives the trading and order flow. The Depository will have 7/8 people and the overall headcount of the Exchange will be around thirty. A list of the people and their positions is included as Appendix 14.

B. The Securities and Exchange Commission

It is illegal to trade securities anywhere other than on the stock exchange. To enforce and regulate this rule along with others which may arise, the Government of Poland has established the Securities Commission, a regulatory body structured along the lines of the U.S. Securities and Exchange Commission. The Commission is responsible for issuing licenses to brokers and to monitor and provide disclosure rules for the issues to be listed on the exchange. The general and training requirements for a license have just recently been finalized and the first exams were held last week for the broker's license. The exam was prepared by the Securities Commission. The requirements for the investment manager have not as yet been finalized.

A Securities Committee was originally established under "The Law on Public Transactions of Securities, and on Funds Held in Trust" to observe and regulate securities transactions. The committee is made up of nine Members:

- o the Chairman (designated by the Prime Minister)
- o eight other prominent Ministers:
 - representatives of the stock exchanges
 - stockbrokers
 - and Chairman of the State Bank and Anti-Monopolies office.

The five basic fields of activity are:

1. Granting permission for conducting public transactions of shares and obligations of economic bodies
2. Granting permissions for the operation of stockbrokering businesses, stockbrokers, and funds held in trust in the securities market
3. Administering the operation of the securities market and its participants
4. Adjusting the market and ensuring its stability and development
5. Advising the investors on the mechanisms of the operation of the market and accepting complaints against bodies acting in the capital market.

C. The Privatization Factor

The construction of the WSE and SEC is happening as the Country is moving swiftly towards Privatization. The Government is determined to act rapidly in privatizing the state-owned companies by giving vouchers or distributing up to 20% of the shares of a target company to the workers. On June 30, 1991, the Polish Ministry of Ownership Transformation announced its plan to distribute shares of stock in all state owned companies. This would enable approximately 29 million Polish adults to acquire capital ownership in the companies that would eventually apply for listing on the stock exchange.

While the details of this global share distribution program remain to be worked out, it is clear that a scheme of this kind and magnitude will have profound consequences for the design and implementation of a trading system, clearance and settlement systems, and above all, a national depository. All of the previous assumptions concerning the volume which these various functions must be capable of handling must be reviewed anew. Certainly, the creation of 29 million new shareholder accounts, all of which must be maintained, kept up to date, reported on, dividends distributed, etc., must now be taken into account in the design of an automated system, including hardware, for the depository function. These design efforts should go hand-in-hand with the design and implementation of the share distribution scheme of the Ministry.

The ability to establish true value of a company going private is the biggest obstacle at the present time. No adequate accounting records of prior years exist and the true value of a company may have to be established through valuation of assets. Another key problem that the capital markets will face in the near future is that as companies go public, they will have to be managed for profits. This will have a drastic effect on employment.

The final draft legislation privatization on allows for the possibility of regional exchanges, but possess stringent capital requirements. The exchanges can be set up as corporations owned by brokers, banks and the State Treasury. The only stipulation is that they must apply to and be approved by the Council of Ministers.

The Privatization Act does not prevent foreign ownership of shares in the secondary market. The Act only allows 10% of the company's shares in the primary offering to be of foreign capital investment without the Ministry's approval.

D. The Role of the Societe des Bourses Francaises

The Warsaw Stock Exchange has been working in conjunction with the French Societe des Bourses Francaises to develop an environment and system comparable to the Lyon Stock Exchange.

The reasons for selecting the Societe des Bourses Francaises as the foreign partner for the WSE were detailed by Dr. Wieslaw Rozlucki, President of the WSE, in a document called "The Securities Stock Exchange; Realization of the Project." Dr. Rozlucki was appointed by the Ministry of Ownership Transformation and oversees a twelve member board of directors running the Exchange. After the Polish Ministry of Ownership Transformation determined it would be more pragmatic to select only one foreign partner to establish and advise the Exchange, it selected the French. Many factors determined the decision:

- o the long tradition of securities market in France
- o the new developments in transactions and balancing systems in France during the last ten years
- o the adjustment of the proposed model to Polish conditions
- o the securing of the adequate and cost-efficient number of experts and suitable funds.

The agreement was finalized in October 1990. The scheme consisted of three parts: a feasibility study, a temporary system of secondary market operating between April and June 1991, and finally the official opening of the stock exchange in June 1991. The computerization of the stock exchange operations is scheduled for the second half of 1991.

The SBF have offered a great deal of assistance in explaining the organization of the stock exchange and the clearing and settlement procedures. They have worked with the specialists, banks, brokers and exchange management. At times the SBF have had as many as 12 people actively involved in training, writing settlement procedures, and preparing the initial critical analysis. They provided the volume projections and will propose an overall system solution. Eurogroup Consultants has worked for the SBF as a sub contractor on the project and currently have 3 people assigned to the project.

II. OTHER PROPOSALS

The expected proposal from the Société des Bourses Françaises is the only full scale proposal for the automation of the WSE under preparation. Other partial proposals have surfaced and are reviewed below.

The Nynex corporation offered to do a study for \$30,000, and then propose a new system with communication capabilities. The proposal is included as Appendix 10.

Arthur Anderson presented literature and has informed the Exchange that it would be willing to bid on a contract to provide consultancy services. They requested all projected volume figures and other information that the Exchange did not have at the time. Since the initial meeting, no further contact has been made.

A German software company, Quantum (Q-SOFT) proposed a system based on the Dusseldorf Stock Exchange. It is written in UNIX C and would require different terminals that are currently being used. The system does not include any settlement processing and was very expensive. No further follow up on this proposal has been made. The proposal is included as Appendix 11.

A letter from Digital Equipment Co. was received that requested a meeting to explore what they might do to help the Exchange. A meeting was scheduled for June 20, 1991, between Digital Equipment, Price Waterhouse Poland and the Exchange. It was rescheduled.

It is envisioned that the SBF system proposed will provide for a Broker-Exchange-Depository interface. Whether the proposal will include back office processing for the brokers and their clients is unknown.

The following table highlights the status of each proposal received at the Exchange:

<u>PROPOSAL</u>	<u>STUDY ONLY</u>	<u>SOFTWARE</u>	<u>HARDWARE</u>	<u>COST</u>
SBF	completed	integrated?	IBM AS/400	?
ARTHUR ANDERSON	not done			
NYNEX	proposed	commun. focus	?	\$30,000
DEC	to meet	?	VAX	?
QUANTUM (Q-SOFT)	completed	trading only	UNIX	300K+DM

III. CURRENT SYSTEM OPERATIONS

The Exchange is currently in session every Tuesday from 9am to 12 noon. The day's quotations are available after the close of trading, and may fluctuate by 10% from the prior week's closing price. There are five issues traded on the Exchange with a sixth one scheduled to begin trading on the 25th of June. With the relatively low volume on the exchange the current method of handling trading and settlement can continue for an unlimited period of time. The Exchange will probably add three additional securities (issues) to be traded in the next few months. This will bring the total issues traded to a total of nine.

The trading of shares is based on a centralized book-entry system. A national Depository has been established to maintain the custody of all securities admitted to trading on the exchange. The bookkeeping entries will be done by the Depository which is entirely owned by the Stock Exchange. Brokers/Banks receive statements of their holdings from the Depository. The money settlement on all trades is under the responsibility of a central clearing bank, The National Bank of Poland (NBP). Once it is confirmed that the brokers and specialists have sufficient funds to cover the settlement of trades, the WSE is notified and the Depository can proceed to move the shares. The Depository is only responsible for the movement and accounting of securities and not the money. A copy of the functions of the Depository system (draft form) are included in this report as Appendix 9.

The current procedures provide for a separate terminal and specialist for each new issue. As the volume increases, the addition of hardware to support it, is not very effective. The Ministry has been loaned five Compaq 386 terminals and a file server from the (British?) Foundation.

A paper on the role of the specialist and the Quotation System is provided at the end of this report in Appendix 5.

The brokers act as agents for their clients and take orders through a branch network, if they are special accounts. Some of the brokers are not as automated as the biggest (PKO S.A.) and will only work through the main office. An agreement must be signed to open an account and spells out the regulations of the broker to render stockbrokering services. The forms from PKO S.A. are included in Appendix 19.

The clients must deposit funds equal to the amount of shares being purchased plus 10%. The value of the shares to be purchased are based on the previous week's closing price plus a 10% upward fluctuation. There is a fixed commission schedule and a set fee schedule for using the Exchange and Depository. The specialist also pays for terminal line charges and access to the terminals. The Exchange capital requirements are included as Appendix 8.

Once the order is executed on the Exchange a contract note is produced and delivered to the brokers. The specialist and Exchange keep a copy. The broker must re key the notes into their own computer and produce confirms or letters to the client which will be used as the client's receipt as a proof of ownership of the securities in the

Depository. In this way, the bank arm of the broker is in effect acting as the custodian for the client.

Currently trades settle on T+3 if there are no problems with the accuracy of the original order that was keyed into the specialist terminal. The money and shares must be available in the brokers account.

The security number for each issue is a four digit number (0101-0106). The bank/broker number is three digits starting from 901. There is a two digit type added to the bank/broker number designating whether it is a bank, broker or specialist account.

Prices can change by 500 Zlotys for issues trading under 100,000 and by 1000 Zlotys for issues over 100,000. The shares are traded in 5 share lots. The specialist is in the middle of each trade, representing the buyer and seller.

The settled contract notes are posted to the Depository journal and the respective issue and bank/broker/specialist ledgers. This is all done manually and kept in ledger notebooks. The main issue ledger must balance out with the number of shares originally distributed by the company. Transfers of shares are made between the original lead underwriter and the broker account a client chooses.

There are no provisions made for processing dividends, interest or future corporate actions. This will probably be handled manually with the Depository account being credited at the clearing bank. The bank (NBP) will then debit the Depository account and credit the individual broker accounts. The broker in turn will have to do it's own back office processing and credit the client accounts.

IV. PROGRESS TO DATE

The Warsaw Stock Exchange has been working in conjunction with the French Societe des Bourses Francaises (SBF) to develop an environment and system comparable to the Lyon Stock Exchange. The SBF have structured the workings of the exchange and settlement functions along the lines of their own regional stock market. It includes an objective pricing and trading system that is oriented towards the small investor. Some of the specialist functions are automated on a PC which uses an internal Quotation system that was written by the WSE development group. Although the current system is functioning, continued maintenance could possibly be problematic since the original key programmer is no longer with the Exchange.

Currently, the SBF are writing their long-term proposal to the Warsaw Stock Exchange. This will include the functions, costs for hardware and software (possibly free), personnel requirements and implementation schedule. From conversations with the SBF representative and the Eurogroup consultant, the system being proposed is scheduled to start in July. With a joint Polish and French team it will be ready for implementation at the end of the year. An advance copy of the proposal was not available at the drafting of this report as it will not be presented to the WSE until July.

The WSE development team has just completed the specifications for the automation of the Depository functions. This system includes approximately 50 modules and will be written in DBASE IV on the PC's. At the writing of this report, we currently reviewed an alternate database that may expedite the development, and permit improved performance. These programs will eliminate the manual and clerical procedures in place for the Depository recordkeeping. The design specifications for the Depository system are included in Appendix 17.

An automated system is needed to safeguard the books of the Depository, which is currently all paper forms. The new programs are being looked at as a prototype of the new system. It will provide the development people knowledge of the trading to settlement procedures. This is important since most of the team has recently been hired and does not know capital markets. The more people with this experience and training will be invaluable to the Exchange in the future. The limited number of people on the team, and the size of the project, will preclude the WSE development team from also working on the development of any new system that may be proposed by an external vendor. This resource constraint has not so far been recognized.

V. ANALYSIS OF REQUIREMENTS

The Critical Analysis, "A Computerization of the Warsaw Stock Exchange," describes the requirements of the automation of the WSE in three phases: initial research phase, launch phase, and automatization phase. Although the Critical Analysis delineates the automation of the Exchange as a whole it also discusses various specific issues (see appendix 7), specifically volume, hardware and software needs.

The expected volume figures are detailed in the analysis and were compiled by a joint team of the SBF and the WSE during the six months of on site team effort. Based on the volume figures for the past two weeks and future plans, the estimates provided in the Analysis will be on target for the next two years.

The machine proposed in the analysis is the IBM AS/400 and the models are the C10, C20 or C25, although the WSE team would probably want the D10-D25 with the current technology available. If these configurations are carried forward into the SBF proposal from the analysis, the system will be sufficient for many years to come. The D25 configuration will be too big for the projected two year volumes, a suggestion which should be confirmed in the new proposal.

The proposed plan must have flexibility to increase number of issues, brokers and volume of trades over approximately 50 terminals. This would provide excellent response time to all parties. The overall concern should be whether the French system, which is very old, is coded efficiently. If the system software is indeed too old, then the French software may use the AS/400 in an emulation mode and not achieve the desired throughput, causing degradation of performance.

The hardware proposed cannot be costed without knowing what the system requirements are for the software. On a preliminary basis the IBM salesman was contacted and given the tentative configuration. The C10 series is now obsolete and should be replaced with the D10 series. The advantages and comparable cost of the D10 series keeps it in the running. With the D10 series you can get 60% more throughput at no increase in cost. We are projecting up to 50 information window terminals on-line with the specialists and brokers. They would have access to the trading and settlement systems.

The Critical Analysis suggests a back up (2nd) computer is required. It shows the Exchange System running on one and the Depository System on the other, backing each other up. This may not be necessary and would be too expensive. The money could be better used for a backup power supply. The system will back itself up on any power failure by downloading to a disk.

VI. SHORT TERM IMPROVEMENTS

There are long and short term improvements. Following are delineated the short term improvements to be carried out over the next eighteen months. In the short term, a change to the current environment and the way they operate may not be a viable solution. The people have gone through extensive training on the trading side and are familiar with the procedures and the PC system for pricing and reporting.

The PC system should continue to be developed internally. This will provide excellent training for the staff and eliminate the clerical recordkeeping currently in place. The newly developed PC - system will function as a prototype for any major new system development undertaken. This will conflict with the personnel requirements for the implementation any new external vendor proposal. At this time it is more important to eliminate the error prone manual work of posting to the Issue and Account Ledgers. The PC- system should be completed and implemented by Sept. 1991.

We recommend that the PC-system should be built with FoxPro as the database rather than DBASE IV. This will allow faster and more accurate updating of files and more efficient performance. The ease of using FoxPro will also speed up coding and testing. The comparison of the two database systems have been given to the development group (See Appendix 18).

There are extreme demands on the current staff to accomplish many tasks associated with an automated Exchange system. The conflicts that will arise, for instance, the need for the development team to work with an external vendor team in implementing the new system will necessitate division of labor decisions. For example, if it is decided to go immediately with an external vendor proposal, that external vendor's team will have to work alone as the internal team will be focusing on the short term solutions such as:

- o Computer security
- o Data integrity
- o Depository - convert manual to automated
- o Provision for multiple issues on the terminals
- o System integration - linking trading, clearing, settlement, processing and depository
- o Interim PC system database facilities
- o Interactive network
- o System documentation

An information technology audit should be conducted to provide the controls needed to avoid any critical problems with integrity and disasters. This will establish the procedures needed for safeguarding the important records and systems of the Exchange.

All diskettes from the system and the copies of the depository records should be maintained "off-premises". This will prevent loss of files causing major control problems. It is important to establish procedures for any manual system, to prevent loss by fire, theft, water damage, neglect or other disasters.

There seems to be a problem with using DBASE IV on the Novell Netware. This could be caused by using multiple copies of DBASE IV on different PC's. You are not allowed to load vendor bought software on more than one PC. There may be blocks on the software that is causing the Novell Netware not to work on the network. This should be verified immediately before serious trouble occurs with the network and the Exchange System.

All software should be bought from legitimate software dealers with documentation and guarantees. The dealer should provide support for purchased software. This is the main system, do not cut corners and expose the system to problems.

The current method of adding a terminal for each new issue is not going to work much longer. It is too expensive and not efficient. If a specialist is from the same company and has more than one issue, he may have to double up on the terminal. Changes to the Quotation System must be made to support multiple issues on a terminal. Right now one issue must be completed before the other is worked on. Many of these problems go away if the brokers can enter the orders directly, through their own terminals or by using the diskette. An automated settlement and trading system will be proposed in the following section.

PROPOSED SOLUTION TO PAPERWORK FLOW

An automatic settlement system can be implemented using the current PC programs and the new Depository system under development. This is how it will work:

1. The brokers should enter their own orders on a PC and generate a diskette that they can give to the Exchange on Tuesday morning. All brokers without PC's will have to continue delivering their orders to the Exchange on Monday. These orders will be entered into the Exchange PC and combined with the other orders on Tuesday morning. The Exchange will provide a listing on Monday night to the brokers to verify accurate trade entry. All corrections will be made on Tuesday morning prior to the combination run.
2. The combination run will occur Tuesday morning (Trade date -T). Separate diskettes will be created for each specialist terminal, for each issue. The diskettes will be loaded exactly like the orders are entered without the data entry by specialists.
3. All the same reports can be run and the Quotation System can generate the closing price for the session. The system can calculate the price and the associated trades to be executed. The specialist will continue to have the final say in determining the price by using an override procedure.
4. The contract notes will be generated and all trades not executed will be put on a pending file for next weeks combination of orders (if they are still within the date limit). The notes will also be available on diskette for the brokers who can use this for automatic input into their back office system. They can

create client confirms from the contract notes.

5. All executed trades will be considered ready for settlement and on the morning of T+1. Only corrections, with the consent of the Exchange, will be accepted until noon. Since the brokers entered the orders themselves there should be only a few possible errors. The Exchange in effect is now working only on an exception basis. There is no need to work with the notes coming back from the brokers. These will only continue to grow in volume and will create a paperwork bottleneck in the system.
6. At 3pm, on T+1, the system will produce an Interim Clearing Report. This report will show all the debit's and credit's to each broker and specialist account. This is based on the trades that have all been validated by the brokers. The brokers will receive this report and the clearing house bank will get a copy.
7. The clearing house bank (NBP) will lock up funds for settlement on the morning of T+2, based on the Interim Clearing Report. All cash defaults are reported to the Exchange and the brokers. Brokers have until 6pm, T+2, (or when bank closes?) to put in the required funds. The clearing house bank will notify the Exchange of the final disposition of funds and the Exchange will follow any backout procedures if necessary.
8. On the evening of T+2, the Exchange will process all settlements and update the Depository ledger accounts (in the new PC system under development). The Exchange will verify all securities were in the account of the sellers on the night of T+1. Any exceptions would have appeared on the Interim Clearing Report. Statements will be produced for all Depository settlements and made available to the brokers on the morning of T+3.
9. The Final Clearing Report will be sent to the clearing bank instructing them to debit and credit all accounts. The clearing bank also sends statements to the brokers verifying the money movements.

This is a general outline of how you can eliminate most of the manual effort and paperwork associated with the settlement of the securities on the WSE. Dates can be advanced so that settlement falls on T+2, if desired. The reports can be designed to consolidate contract notes and processing halted transactions on an exception basis. Further discussions should be held to iron out the details and to validate the approach. In any case something along these lines should be considered for implementation as soon as possible. This overall flow and some of the details have been discussed with the senior project leader.

The Warsaw Stock Exchange is in need of making sure their current system is secure and under control for weekly processing. The current PC system maintains all the data files and is controlled by the development group. The diskettes should be copied and backed up daily. The "on-premises" diskettes should be kept in a safe or in some other safe storage area.

The Depository system is maintained by the Depository accounting group and is officially in books, on ledger forms. These books must be copied daily after the close of postings in order to keep back up copies of the master files of the company. The internal Development Team is designing an automated system for the Depository that links with the current PC-based trading, clearance and settlement system. This design, however, does not take into account the workload that could result from the creation of 29 million new stockholder accounts as a result of the privatization program.

VII. KEY REQUIREMENTS FOR THE LONG TERM SYSTEM

The system chosen should be able to respond to changing market conditions and be flexible to support new products and new regulatory requirements. The system should meet international standards and be automated to a degree that it will attract foreign investors. The efficiency of the system and the operation of the Exchange and the Depository, will be known immediately in worldwide trading circles. It is of extreme importance to make sure all the controls and accepted auditing procedures are in place at inception.

The necessary components of a desirable securities transaction processing system include:

- A locked in trade concept, with processing by exception,
- sufficient computer capabilities to handle trade execution and reporting,
- integrated clearance, settlement, and updating of depository records on a timely basis, and
- an adequate communication network for connecting the major functions involved in the trade execution and settlement process.

The expected SBF proposal will probably suggest an end of year implementation schedule. Based on the planned number of issues scheduled for this year, a new system can be postponed for up to a year without adverse effects on current operations.

Any new proposal must be carefully evaluated to determine the critical success factors needed for a smooth implementation. What will the system include in the way of functions for the trading, clearing and settlement processing. Will all functions be totally integrated? The linking of the clearing bank function with the depository functions is extremely crucial in the running of the Depository. Securities and money should not be moved without the required positions being available to the system for settlement.

A Strategic Review of the Exchange should precede any solicitation to ensure that proposals take into account future realities. The Exchange should evaluate other systems that may offer turnkey solutions. Possibilities for these solutions include hardware vendors in joint ventures with software companies. Some of these are Digital Equipment, Stratus and Tandem. All proposals should include automatic trading, allow for specialist intervention, and have an integrated depository and clearance and settlement system.

Any system that is brought into the Exchange can allow for the hardware and software to be paid by the fees generated from trading and the depository. Many vendors will propose to run the system under a facilities management contract. This would provide all operations and maintenance to the system.

A system for processing dividends, interest, and corporate actions should be designed and the specifications and procedures written. At first the manual procedures can be followed but programs should be written to automate the process and link directly with the Clearing Bank. This system must be carefully controlled because dividend income distribution, if not handled efficiently, can create major liabilities to the Depository and Exchange. Many firms in other countries have had dividend problems and require long and tedious investigations by many people to answer customer and broker claims.

The brokers should be provided monthly statements of their open account positions in the Depository. They should be reconciled by the brokers and a return document forwarded to the Depository confirming that they are in agreement to all account totals. Any discrepancies should be immediately resolved.

VIII. RECOMMENDATIONS

The WSE should:

1. Implement a thorough review of the assumptions which form the basis of a strategic plan to develop the operations of the stock exchange and depository.
2. Issue multiple invitations to bid: Once firm bases are established for the future direction of the exchange, the WSE should plan to issue an invitation to several firms to make proposals for an integrated trading, clearance and settlement system. The SBF proposal which is currently in preparation, can be compared to these proposals.
3. Integrate the Quotation System and the Depository: Develop the internal system to integrate the Quotation system and the Depository. The WSE should continue using the enhanced PC based system for the next year. Outside technical support should be contracted for to assist the development team in database and network evaluation for ease of development and efficient performance. Identify any limitations of the database software currently being used.
4. Conduct an Information Technology audit: An information technology audit should be done to verify the operating procedures and to develop back up and recovery standards for the system. An audit should also be made to formalize all Depository procedures and to protect the books and records of the Depository.
5. Develop the internal WSE system in the short-term: Implement the proposed internal automatic trading and settlement procedure presented in Section VII. Foxpro should be used instead of DBaseIV. Processing should be performed on an exception basis, eliminating a great deal of paper. The Quotation system should be modified to provide for multiple issues to be processed on single terminals. This will benefit the exchange by limiting additional hardware investment for new issues. Back-up and recovery plans should also be established.
6. Market the Exchange and brokers to the Public: The procedures of the Exchange and Depository, including the rules and regulations should be made available to the public. The Exchange must advertise the automated system to the public and build their confidence in the stock market.
7. Provide regulatory reporting: There are no reports currently being produced for regulatory purposes. The Securities Commission should provide their requirements to the Exchange.

IX. NEXT STEPS FOR JOINT US/POLAND ACTION

From the examination and interviews conducted on this visit, it remains evident that the opportunity for joint United States/Poland projects is quite high. Based on our experience with capital markets development in other emerging markets around the world, we recommend that the automation needs of the Warsaw Stock Exchange be viewed in a larger context of the development of a securities industry as part of the capital markets. We offer below several ideas to further assist the development of the securities markets of Poland.

1. Provide expert consulting services to the WSE to assist in reviewing a strategic plan for the development of the operations of the exchange in the light of privatization plans, and to assist in evaluation of actual proposals received in response to solicitation.
2. Technical assistance to the WSE should be provided on a continuous and consistent basis over the next eighteen months to two years. This technical assistance should comprise a securities industry specialist and an information technology advisor, plus some specialized short term advisory services.
3. Present an information technology audit plan with appropriate technical assistance provided.
4. Establish a training program for Exchange employees in all aspects of the securities business. This will require Technical Assistance by specialist trainers.
5. Provide technical assistance on drafting rules and regulations of the Exchange and Depository.

X APPENDICES

These appendices are available separately, and have been delivered to AID/PRE/EM and the Treasury Department.

- 1- POLISH STOCK EXCHANGE
General information and start up scenario
- 2- SECURITIES COMMISSION
General legal regulation
- 3- PRIVATIZATION THROUGH TRANSFORMATION
Chart of steps
- 4- IBM STUDY OF CLEARANCE AND SETTLEMENT FOR THE U.S. CONGRESS
Societe Des Bourses Francaises
- 5- THE ACTIVITIES OF A SPECIALIST ON THE STOCK EXCHANGE
- 6- STATUTE OF ASSOCIATION
- 7- COMPUTERIZATION OF THE WARSAW STOCK EXCHANGE
A CRITICAL ANALYSIS
- 8- TABLE OF FEES
- 9- DEPOSITORY PROCEDURES
- 10- NYNEX PROPOSAL
Letter and plan for a study
- 11- AN OFFER FOR THE INSTALLATION OF THE BIFOS INFORMATION AND REALIZATION OF STOCK EXCHANGE ORDERS SYSTEM
Proposal from German Co.-Quantum (Q-SOFT)
- 12- IBM HARDWARE CONFIGURATION
Prepared by IBM salesman in Poland
- 13- THE BILL ON PUBLIC TRADING IN SECURITIES AND TRUST FUNDS
- 14- ORGANIZATION OF THE STOCK EXCHANGE
- 15- OFFICIAL CLOSING QUOTATIONS OF THE WARSAW STOCK EXCHANGE
- 16- THE STOCK EXCHANGE IN POLAND - CHALLENGE AND OPPORTUNITIES
- 17- DEPOSITORY SPECIFICATIONS FOR THE PC SYSTEM
- 18- COMPARISON OF DBASE IV AND FOXPRO
Program development tools for the PC system
- 19- CLIENT AGREEMENT AND REGULATIONS FOR STOCKBROKERING SERVICES