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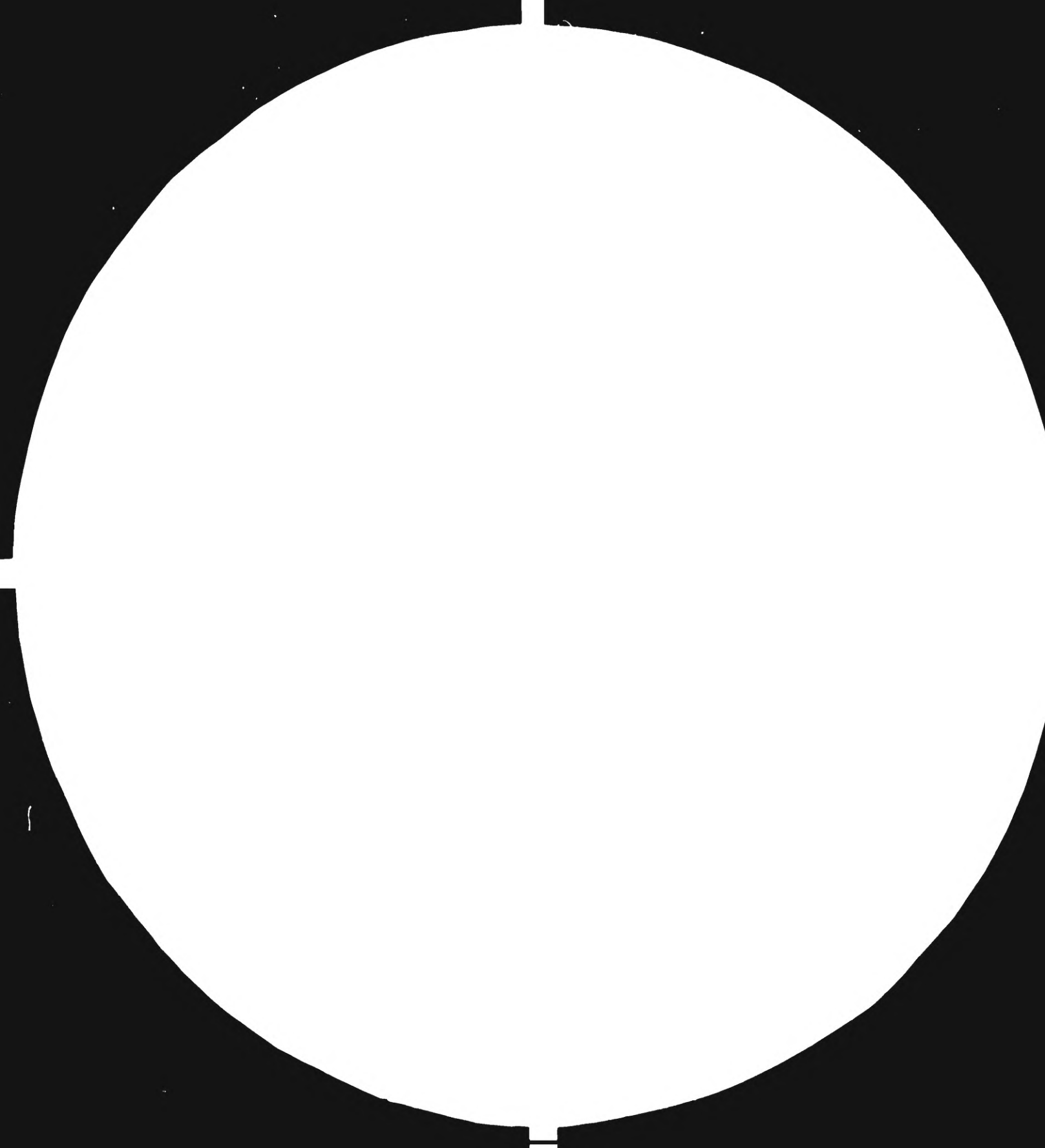
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## MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS-1963-A

NATIONAL BUREAU OF STANDARDS, Gaithersburg, MD 20899

ANSI Z39.48-1968 (PERMANENT)

148  
Abdulwahid M. Turki

LEVEL OF COMPUTER RESEARCH AND DEVELOPMENT IN  
INDUSTRIES OF THE MIDDLE EAST

13613

These notes are a result of a UNIBO sponsored mission to Iraq, Kuwait, Jordan, Syria, Egypt. The present author wishes to thank the sponsoring organization for making his trip possible, UN ECWA officials for their assistance and encouragement, UNDP officers in visited countries for their help in administrative matters and in organizing some visits and, last but not least, co-membres of the mission: Mr. Felix Hinc and Mr. Hassan Sharif for excellent cooperation and many helpful discussions. Particular thanks are due to Mr. Sharif whose profound knowledge of the region and wide contacts with key people in the field were invaluable in achieving objectives of the mission.

The mission was conducted in October 1983. These notes are based on interviews with over 50 people in more than 30 organizations. Impressive as these numbers may seem, the author is fully aware of the limitations of his research base. It is therefore his duty to warn the readers that these notes should be taken for what they really are: impressions from a three-week mission. Under no circumstances should they be used as a definitive survey. It should be also borne in mind that in a field undergoing so rapid changes, any observations tend to date very quickly. Thus the validity of these notes may substantially decrease with time.

It is by now a well-established fact that the "soft" part of a computer system is responsible for the lion's share of its cost. Various authors give different estimates of the relevant percentage, it seems, however, to assume that the figure is not less than 70% with a pronounced upward trend. A unit of raw computing power

- however defined - is the only commodity on the market whose price constantly decreases with time in absolute terms, let alone discounted for inflation, while the cost of qualified human labour - the prime constituent of software costs - keeps on growing. The problem is even more acute when we take into consideration the ever growing complexity of software, with ensuing increase in the amount of human work needed to complete the design and implementation of software and then to maintain its applicability in face of ever changing applications. Even in the countries where human labour is relatively inexpensive, the relative cost of software may be prohibitively high if there is a shortage of suitably qualified personnel. In all countries of the <sup>Arab</sup> Arab region there is an acute shortage of well-qualified programmers and system analysts. (One source estimated that in whole Syria there are only 20 - 30 really qualified programmers, a number almost certainly smaller than that of mainframe computers installed in the country.)

It should be noted that the cost of developing a software system or package practically does not depend on the computer on which this software is to run (if anything - the cost of producing a piece of software for a microcomputer is higher than for a mainframe machine because of limitations imposed by smaller memory and less sophisticated firmware.7). Thus the cheaper is the computer, the more expensive becomes its software. In fact, software for microcomputers would be so absurdly expensive that no one would be willing to buy it, were it not for the fact that microcomputers are sold in very large numbers, and thus the cost of software packages - distributed over a very large number of customers - becomes reasonable. The conclusion we must draw from these specific considerations is that if microcomputers are to be

viewed as viable proposition, one of two things must happen: either they are sold in large numbers and for the same application, or the production of software for them must be heavily subsidized. This problem has been solved in developed countries by mass-market methods: standard application packages are sold over the counter, in cassette or diskette forms, at prices seldom exceeding 10% of the cost of the microcomputer. Unfortunately, the by far greatest majority of these packages in their present form are inapplicable in countries of ECWA region. The reason is quite simple: the packages are written so as to accept information and present results in latin alphabet.

The problem of arabization of software is by far the most important one in the whole issue of making inexpensive applications of microcomputing viable in the countries of ECWA region. Since this problem looms large also in most most many other issues, we are justified in analyzing some of its aspects in greater detail.

The most obvious differences between arabic and latin way of writing are the different shapes of characters and the direction of writing (left-to-right in latin based languages; right-to-left in Arabic). The less obvious differences are the omission of most vowels in Arabic and the fact that numbers are written in Arabic in the same direction as in latin alphabet based languages. Finally it should be noted that Arabic is a highly flexional language with declination changes influencing not only the suffixes but also very often the root parts of nouns.

It is obvious that any information processing involving inscription (rather than just numbers) - and most applications belong to this category - must take the arabic character set into account. This is

correct order. This problem goes beyond simple encoding and decoding, as the actual shape of an arabic character depends on its position within a word: the same character takes one shape at the beginning of a word, another in the middle, yet another at the end. In addition, plentiful ligatures (combinations of two adjacent characters into a single "double character", like "fi" combination in Latin text replaced by a single ligature) are not only desired for aesthetic reasons, but compulsory. Even if input is done by keying in and thus the correct interpretation may be assumed, the output cannot rely on a simple and unisue <sup>external</sup> ~~internal~~ representation of the internal code but must, <sup>take</sup> into account the context in which this character is to appear. An alternative consisting in assigning different internal codes to all possible variations of characters is not only impractical (their number exceeds 255 and thus can not be accommodated in a byte) but would also immensely complicate sorting and retrieval functions, as for these purposes all variations of a single character are to be considered equivalent.

It should be noted that the problem of correct input and output of arabic characters is by now more or less successfully solved by vendors of all screen-display equipment. For hard-copy printers the problem is also solved, but as yet not quite satisfactorily: the printers are either quite poor quality, or in attempts to achieve an acceptable quality the speed has been sacrificed. (Best quality printers run at 1/6 of their "latin" speed, printing 200 lines per minute rather than 1200.) In any event there is a considerable amount of context detecting software interfaced between standard print mechanism and memory feed routines. In time this software may be put into IC chips.

Unfortunately, no standard internal representation of arabic characters is being used, in spite of the existence of ASCII defined standard codes CODAR U and CODAR U PD. This makes any digital transmission of information in Arabic impossible between centres which do not have a prior agreement on coding (and which do not consistently obey by this agreement). Any exchange of computer media is also limited to those parties which happen to use the same coding.

Passing to the "direction of writing" issue, let us observe that in a record with both alphabetic and numeric fields, the directionality of writing and reading changes depending on the field. This, by itself, is not a very difficult problem to cope with, unless one wishes to use a clever storage-optimization techniques by compacting. But if we want to arabize a piece of software which included handling of alphanumeric fields (an data base package falls into this category!) we immediately see that the effort is not limited to plain transliteration issue: even the simplest "next" command must be now replaced by a moderately complex subroutine (whether actually inlined or inserted in line does not matter very much).

That even on the relatively unsophisticated level of application the transfer of software from Latin base into arabic base poses very software writing problems. Actually, these problems are completely solved only in very few of the visited places. Vendors of hardware usually limit themselves only to I/O parts of the problem. The field invention part is left to the user or to a software specialist, of which there are not many. Quite complete solution has been obtained in National Computer Systems Ltd of Amman, ~~xxxx~~ Jordan, but again because of the lack of standardization, their solution is not directly transferable to all parties in the region (and a



heart from the issue of proprietary rights, which is not to be neglected as the NCS Ltd is a private company!).

The problem of homography poses a serious obstacle in many text processing applications. For instance, spelling correction - a very valuable part of any reasonable text editor in English or French - is not incorporated into any word processor in Arabic. (In fact, the word processors we have seen are used almost exclusively as "character processors" - semiautomated pretty text composers. Even the very sophisticated equipment, like CPT 3100, is used in this fashion, with operators unaware of the more sophisticated features for the latin version, let alone for Arabic. One is led to suspect that the vendors, selling the "bilingual" word processors, hide from the prospective customers the more sophisticated potentials of the English version so as to avoid unpleasant comparisons!).

It should be stressed that arabic homography is much more frequent than in English or French. Thus, while an English word processor in the spelling correction mode may easily accept "spring" as a correct word even in context where "Spring" would be required (to differentiate between the two a very deep semantic analysis would be called for), a simple-minded Arabic word processor would accept by far too many misspelt words only because they appear as <sup>the</sup> correct spelling of another word.

It is not clear how the problem of arabic homography can be overcome. On one hand, the scope of homography could be <sup>greatly</sup> reduced by insisting on inclusion (and encoding!) of diacritic signs, commonly used in beginners texts (such as elementary grade texts), and just as commonly ~~omitted~~ omitted in common texts (newspapers etc.).

With diacritics, the extent of homography is greatly reduced, probably not larger than homography of English, which makes dictionary

look-up methods of spelling correction sufficiently powerful. This approach would however require that on the input side the texts need to be presented in a form different from that used for hard copy printing (on output side the diacritics could be omitted altogether). This means that the typist should be trained to write with diacritics, which was discouraged ever since they left ~~xxxxx~~ elementary school. In addition, if the word processor is coupled with, say, a type-setting equipment (an application much desired for newspapers!) the text must <sup>b</sup> input twice, or - if it is written with diacritics- the type-setter must be fed the output of <sup>the</sup> text processor.

On the other hand, the reliance on the diacritic signs may be avoided by semi-semantic preprocessing inserted between the keyboard input and internal representation. This kind of software, to the best of my knowledge, is not in existence. Its development, at least to acceptable level of completion, seems feasible, but calls for a considerable effort.

The flexibility of Arabic causes similar problems in information retrieval as for any language in which flexion cannot be practically disregarded (Polish, German, ~~xxxxxxx~~ in a sense Finnish). It is however to be noted that because of much higher incidence of irregularities (some 30% of nouns have plurals very unlike singular forms) the standard solution of "chopping off suffixes" may be impractical. Again the problem may be solved by insertion of suitable software interface between the user's query and actual retrieval function, but this software is not available. (Incidentally, an intriguing possibility would be to use the same interfacing software with subsidiary dictionaries both for the flexional synonymy and for unscrambling of homographs in an interactive mode. A deeper study of the problem of information retrieval would be required to determine the

validity of such an approach.)

This brief enumeration of some problems of arabization of software illustrates quite clearly the magnitude of the task of converting and adapting existing software to common use in ECWA region.

In addition to linguistic problems of Arabic, such a conversion must also include adaptation to local legal, financial etc. rules. This may seem rather like adapting software from one country in Europe to another. Not quite! A concept of interest is present in all European banking packages, all such packages become rather useless for Islamic banking which does not recognize this concept. Of course, not all banks in the ECWA region follow the strictly Islamic principle of "no interest on lending", but some do.

Thus the adaptation of software available on Western markets is no small a task, even assuming that this software is available to computer buyers in ECWA countries in the so-called source form. If the software is available only in the user form, i.e. packages without maintenance and modification documentation, the magnitude of the problem is formidable! It should be mentioned that because of weak protection offered to software vendors by the patent/copyright laws of all countries, the amount of information available for software packages is usually kept to minimum (in fact, it is often barely sufficient for adequate use of the package!).

Quite naturally, the indigenous design, development and implementation of software places even stronger demands on the non too numerous software cadre of the region. As the result, most currently operational computing centres rely on the vendors of computing machinery for supply of most software, and - in far too many cases - on continuous software support. Cases like Kuwait University, where a substantial data base for student information

was implemented in-house, National S&I Company in Cairo which designs software for Faisal Islamic Bank, or previously mentioned Jordanian NCS Ltd., are far too few to change the general impression: there is no system design and programming activity, most of the programming is done on the outer shell of application programming, using COBOL and FORTRAN (newer languages are virtually unknown apart from some universities, where they are taught), the advances of software engineering of recent years, the design and programming methodologies, in fact - all progress in software made since early 70s has not made any impact on programmers of the region.

To be quite fair, one should mention that NCS Ltd. uses some software tools, such as automatic screen formatting and layout designing for the design of customers software, that National S&I puts a great emphasis on the methodological side of software design, including careful preparation of specification and user manuals in Arabic, that the budding software division of TEAM International in Cairo has strict programming standards (albeit flow-chart based), and that in Computing Centre of the Royal Scientific Society of Jordan a form of group design is practiced (not unlike the walk-through method). All these examples underscore the predominant limitations of the programming efforts in the region.

It is also to be observed that the art of computer applications is somewhat underdeveloped. Many large organizations use very powerful computers for simplest applications (payrolls, inventory control, accounting), each application being run as a separate job, producing large volumes of output from large volume of data. The concept of integration of applications, even on a simple data base level, has obviously not caught on yet.

A possible explanation may be that most of the leading persons in

computing and management have graduated from excellent universities some years ago - in fact before the new wave of computer applications and new software techniques were introduced. Combined effects of overexploitation of skilled manpower (leaving no time for continuing education) and scarcity of current technical literature in the region tend to conserve status quo ante.

On the other hand, there is ample evidence of the new generation of programmers being born in electronic laboratories, where quite often the work on microelectronics (primarily on controllers and data collecting equipment) leads naturally to interest in microcomputing and programming for EPROMs. Similarly as in other countries, such "upgrading" of electronic engineering creates the new incarnation of machine coders, which coming from very respectable laboratories and not offset by similarly respectable advances in software engineering, cannot but increase the chaos and strengthen the general misdirection of software development.

On the whole, there is a very sharp contrast between the quality of computer machinery used and the level at which it is being programmed and utilized. The underdevelopment of software is further amplified by an almost universal lack of appreciation of this aspect of computer application. Expensive machines attract and get attention (and funds), even more expensive software is very often neglected even by these organizations which could afford "the best".

From the point of view of permanency of values this situation is of course quite absurd. Poorly programmed computers are unavoidably poorly utilized. An increase in demand for computer services is then met by the purchase of a bigger machine, which suits interests of computer manufacturers, but leaves no permanent impact locally.

On the other hand, an improvement in programming technology, an improved software and application methodology not only can defer the need for a new machine, but also have a permanent value, directly contributing to better utilization of all subsequently installed machines.

Thus we are coming to a conclusion that a very substantial effort must be made in order to build regional software industry, which is the only viable and feasible way of preparing any country for conditions of "informatic revolution". Creation of a hardware industry may or may not be feasible in ECWA region. Viability of such an industry would then greatly depend on its ability to keep up with rapid developments in components and subassemblies available on world market, which in all probability would require a very fundamental retooling and reorganization of production every 3 - 5 years. Unless such industry gains a substantial share of the world market for their products, it would require large investments every time it switches its component base. Even if the main market for the regional hardware industry was to be ECWA region itself, its economic viability would be questionable as long as ~~the~~ regional market is limited by the lack (or inadequacy) of the local ~~x~~ software industry.

On the other hand, the software industry develops smoothly. Even if new methods are invented and replace preceding ones, the previous investment does not become obsolete: it is investment in people, in their qualifications and skills. The better they are, the quicker they learn new techniques. Moreover, the system design and system analysis expertise does not become obsolete at all; the know-how about computer applications has a permanent value.

Finally, let us recall that computer utilization in ECWA region is limited by several factors which are specific for the region, such as specific features of Arabic. It is unlikely that these problems would ever be satisfactorily solved by the computer vendors, and certain that they will not be solved by component vendors.

Thus, the creation of software industry in the ECWA region is not only a better economic proposal, it also is a necessity.

Is it ~~vixxixxxx~~ feasible to create a viable software industry in the region? I think, yes. The region has sufficient number of excellent universities which can prepare good programmers. To this end special ~~m~~ education programmes should be prepared and initiated. If this is not yet done, the reason is primarily that no software industry to speak of exists in the region and universities do not wish (and rightly so!) to educate graduates for export out of region only. Thus a policy to establish the software industry must be made abundantly clear to every university and the policy must be credible enough to let the universities embark on the long process of education, believing that in some 5 - 6 years the graduates will find suitable employment. In the meantime, a concentrated and consistent "further education" programme should be instilled on the regional scale, aimed at upgrading the qualifications of the best available software specialists.

The upgrading programme should not be restricted to courses and seminars, although such activities would be very useful.

It has been observed by several people in the region that the expensive but cheapest way of educating high quality specialists is to send a small team - as a team - to work in a centre of excellence for a certain period. On return home, such team

itself becomes a nucleus of a centre of excellence. This practice should not be restricted to electronic engineers, small software teams should also be sent to good software houses abroad to learn and absorb the technology of software design and production.

As mentioned before, there are some organizations in the region where software activities are performed markedly better than the regional average. Such centres should be carefully identified and their activity expanded with encouragement given to improve the quality of their work even further. This could be achieved in a variety of ways, by giving them public contracts, inviting specialists from top software firms to work in such centers for an extended period (2 - 3 years seems not too much, considering the educational role of such a specialist), by coordinating the activities and tasks of such centres on a regional or bilateral basis.

A very promising ~~xxxx~~ approach to improved standards of software production in the region seems to be ~~xxxx~~ the establishment of a regional software programme (not unlike the ESPRIT programme of European Community) aimed primarily at an increase in quality of software tools and at solution of specific software problems (e.g. in use of Arabic). This programme could be made open to software houses, ~~xxxxxxxxxxxx~~ to universities and research establishments in the region and from outside (for the latter it may be required that they cooperate on a given project with a partner organization within the region).

In parallel with building the fundamentals of regional software industry, a wide awareness action should be undertaken. The objectives of this action should be two-fold: to explain the importance of software to current and potential ~~xxxxxxx~~ users



of digital ~~information~~ processing of information and to brief the existing software specialists on current advances in software engineering. The latter objective may be achieved by courses, in which case the preferred format should be a "split course": after an initial part the participants should go back to their work stations for several months and the second part of the course should be directed at analysis of practical observations made by the participants at their work.

Whatever efforts are made at improving the qualifications of software people in the region it is advisable to concentrate on advanced training and education. A major part of a success of any software project is its organization and quality of the leader. A good software specialist invariably educates the team with which he works. Therefore an investment in leaders brings much higher rewards than a broader, lower level training. It should be also observed that software training, apart from very elementary programming courses, cannot be conducted for large auditoria as it depends on instructor's detailed involvement in the work and <sup>in the</sup> progress of each trainee.

DRAFT

27 October 1983  
HS/OS

Mission Report on Micro-electronics in the  
ECWA Region  
8-24 October 1983

Organization: The first part of ECWA mission on micro-electronics consisted of 3 members: Mr. H. Sharif of ECWA, Mr. W. Turski - UNIDO Consultant and Mr. F. Hinc DIELI Consultant.

Mission started in Baghdad on 8 October 1983, covered Baghdad, Kuwait, Amman, Damascus and Syria and ended on Monday, 24 October 1983.

Objective:

- (1) To identify public and private institutions, in visited cities, concerned with micro-electronics and computer usage and application; to meet with key personnel in these institutions and to establish early link with them in preparation of the expert meeting in Kuwait and further planned activities.
- (2) To collect available information on the diffusion of micro-electronics and computer applications, and on the status of manufacturing industries in cities visited.
- (3) To assess needs, propose recommendations, and formulate further fruitful activities for ECWA, UNIDO and other development organizations.

## I. The Mission

The group aimed at visiting as many institutions in each city visited as time and preparation allowed. Effort was made to diversify the nature of institutions visited, to meet with the responsible and concerned personnel and to collect as much information as was available. A summary of these meetings is presented below.

### A. Baghdad

Three visits were arranged in Baghdad: The Electronic Centre and the Documentation Centre at the National Research Council and the National Computer Centre. The visit to the National Electronics Company was aborted by traffic jam. It is scheduled to visit in near future the Electronic Company, the State Organization for Engineering Industries, the University of Baghdad and the Technology University. for Micro-electronics devices visits to such industries as refineries, cement factories, petrochemicals etc. are relevant.

#### 1. The National Research Council: The Scientific Documentation Centre

Visit was made on Sunday, 9 October, meeting with Dr. Faik Sabeyh Abdyl Razaq, Director General of the Centre and Acting Director of the Electronics Research Centre. The main points of the meeting:

- The centre is in transition from manual documentation to computerization using CD ISIS package of UNESCO on a newly acquired IBM machine. The IBM machine at the centre was almost unique in Baghdad and people at the centre were worried about maintenance problems. Maintenance service would be from Kuwait.
- It is expected that UNESCO, in cooperation of the centre and other institutions, <sup>will</sup> ~~to~~ arabize ISIS for Arabic documentation, results are to be seen within 5 years. Meanwhile Arabic documentation remains manual.
- The centre has some bilingual word processing equipment [CPT8/100] but used mainly as type-setter, operators unaware of full capabilities of these machines, real capabilities in Arabic are not known.
- The centre uses the "Lock-~~Head~~<sup>head</sup> Dialogue Data Bank" now via KISR. Plan to subscribe directly and to acquire locally all services including data tapes for most frequently used subjects.

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- The centre suffer from deficiency in qualified personnel, ready to participate in regional training programmes and may offer its services for such programmes. The centre is willing to participate in on-going efforts for Arabization in computer fields.

2. The National Research Council: the Electronics Centre

Visit on 9 October, meeting with Dr. Ismail and Dr. ~~Mirtez~~ <sup>Mirtez</sup>

- The centre started only a few months ago, it is still in the development stage, seeking to develop equipment and personnel. Very little research is going on now but plan to a wide variety of research in electronics, micro-electronics and computer hardware.
- Centre has joint research programmes with Iraqi Universities.
- It has many bilateral relations with Arab Research Centres such as KISR and RSS.
- It has good relation with many industrial enterprises. Research to develop solutions at industrial requests such as on line testing and quality control for the Electronics Company assembly lines.

3. National Computer Centre

Visit was on 10 October 1983, meeting with Mrs. Hind Kandaly, Head of the Training Institute at the Centre. Previous visits were carried out to meet with ~~Dr. Abbud~~, head of the computer centre and Mr. Osama Rawwas, head of Technical Engineering Section:

- The Computer Centre has many activities, the most important being the training institute and the computing service bureau. In addition there is a small research section, a maintenance section and the administration.
- The Centre is rich in equipment of different types and sizes and has good working relations with Bull of France and ~~NIEC~~ <sup>NIEC</sup> of Japan.
- The Training Institute offers courses at all levels and in all aspects of computer sciences including an MSc<sup>E</sup> programme and special courses tailored to the need of requesting public or private institutions; scope of courses cover topics such as programming,

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system analyst; data base; implementation, operation and maintenance of computer systems etc.

- Some research in Arabization was undertaken including a study on frequency counts for different Arab characters, and a proposal for an Arabic key board lay-out for a terminal. The Centre is preparing a study for the experts meeting in Kuwait.
- The Institute receives a few non Iraqi trainees but potentially capable of training wider arab audience. It is also ready to host future regional activities in this respect.
- The Centre has good contact with outside institutions, industrial ones as well, offering computing services, consultancies and training. However, it does not follow-up on the performance of its graduates. Modification and "modernization of courses" do not necessarily meet the actual needs.
- Good working relations with the National research council, other computing centres in Baghdad and the Iraqi universities.
- The Centre publishes a "Computer Journal" twice a year in Arabic, distributed freely to public institutions in Iraq and upon request.

#### B. Kuwait

Most visits in Kuwait were prepared by KISR; institutions visited included research centres, university, computer centres and industry. It is recommended that, if possible in the future, to visit the KOC, the fertilizer company and other relevant industries to discuss further the use of micro-electronic devices.

##### 1. University of Kuwait, Faculty of Engineering

The visit was on 11 October 1983, the meeting was with Dr. Ali Akbar, dean of the Faculty and one member of the Computer personnel:

- The faculty has an electronics department but no computer science department. Courses in computer engineering are given at the Faculty while courses in programming are also given at the School of Sciences. The courses in electronics and computer engineering are very advanced based on IEEE ACM recommendations. However,

there is no graduate programme as yet and thus no research; a micro-electronics specialization is planned for the coming academic year.

- The Faculty hosts the computing facilities for the whole University. Computing power has grown at fast rate almost tripling in two years. Now the facilities available are huge compared to any other university visited, highly under used, at about 35% capacity only.
- Computing facilities are leased rather than bought. The advantage is the continuous modernization and updating, included in the lease contract; the sustained maintenance by the supplying company, for no charge is made when computer is not running; a residence maintenance engineer and a huge spare part store on premises. It is to be noted that IBM refused the terms of the lease contract.
- The largest part of computer power is allocated to students information processing, including registration, class assignment, grades, etc.. it is managed as a university data base fully bilingual.
- The Faculty acquired a respectable software development capabilities and emphasize local development of software, though some packages are used as well. I/O Arabization were developed locally in the form of transliteration of Arabic instructions. It is to be noticed however that most personnel is expatriate and there is a need for more qualified experts.
- The Faculty has little contact with Industry and with the National computer Centre. It has better relations with KISR.
- Dr. Ali Akbar expressed interest in hosting the first regional Computer Conference and to participate in organization such annual conferences.

## 2. The IBM Kuwait Scientific Centre

Visit was on 11 October, meeting with Dr. Samer Atassi, Manager :

- The Centre is a non profit organization aiming at development of computer applications in the region. It is hosted by KISR and financed by IBM. The centre carried out several joint projects with KISR, Kuwait University, University of Basra and other institutions.

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- Most applications developed are ready packages modified to fit local conditions, no effort as yet to develop serious local software.
- Some of the developed applications: remote sensing data analysis, e.g. land sat satellite data, solar energy, environmental studies, engineering applications etc.
- The Centre is undertaking some Arabization effort of I/O and text editing on main frame computer: Dictionary, editing of texts, Arabic text editor-formation with diacritics, some speech recognition efforts etc.

In all these efforts software developed with emphasis on end user point of view and no serious effort to consider any changes in operational programmes or into higher level of linguistic analysis.

3. Kuwait National Scientific and Technical Information Centre

Visit on 11 October, meeting with Mrs. B. Abu Zeid, Head of Information Services Department:

- The Centre is part of KISR but offer services to users outside KISR and in other countries as well.
- The Centre is subscriber to and user of "<sup>Lockhead</sup>~~Lock-Head~~ Data-Base Information System" with on line link consuming up to 60 hours/month.
- The Centre carried out computerization of most of its documents using STAIRS package for retrieval of information; with professional approach to information handling .
- Full Arabization of I/O with some effort to go beyond simple transliteration of Arabic Instructions e.g. the processing of " JI " at beginning of words.
- Arabic documents are not arabized except in part, they represent a small portion of handled documentation and restricted to KISR users.

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4. KISR Senior Advisor, Dr. Usama El-Kholy

Meeting attended by Dr. Samir Ahmed Technical Assistant to the Director General and Executive Director of Kuwait National Investment Company affiliated to KISR. Dr. Kholy is an old time expert on the use of the Arabic language in computer with experience extending over most countries in the region. The result of the discussions may be presented as proposed recommendation for further considerations and as valuable information:

- The most serious arabization effort, known of, is undertaken at the University of Petroleum and Minerals in Dhahran.
- There is a serious effort to develop educational Arabic software in Kuwait at Al-Alamiah Arabic Software House, mainly for use on micro and personal computers.
- Among recommended application for micro-electronics technology and computer one may list: on line quality control, process control, health care and hospital management.
- Being unified throughout the Arab region, elementary education offer an important and large market for micro computers and educational Arabic software.
- The proper vision of industrialization in the region should start with the development of software industry and capabilities and with development of specific applications. The second stage may be the assembly of systems, the manufacturing of components will come naturally in later stages.

5. The Kuwait National Centre for Electronic Services and Microfilm

Visit on 12 October, meeting with Dr. Ahmed Sayed Adel, Senior Consultant to the Centre:

- The Centre operates huge computing facilities with very advanced operating systems, machines are bought everywhere but maintenance is contracted to vendors companies. The Centre offer computing services for all public institutions in Kuwait and provide terminals at many users' offices. It supervises the purchase of any new computing power in any of public offices and ministries.

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- The Centre uses standard packages modified to fit needs, and uses COBOL for most applications.
- No serious effort at Arabization beyond I/O since not much else is needed for present services.
- The Centre operate a training facility aiming at preparing the needed personnel at all levels and aspects of computing services, it rarely receives trainees from outside the centre.
- Dr. Adel was very pessimistic about computer manufacturing in the region but feels strongly about the necessity to develop software capabilities.
- The Centre organizes informative seminars to end users particularly high level management and also to the public at large. It is felt that such informative seminars expands on the use of computer and improve the level of applications.

6. KNPC: Kuwait National Petroleum Company

Meeting on 12 October 1983 with Dr. Osama El-Issa, <sup>information service manager</sup> ~~head of Computer Services.~~

- Use of Computer at KNPS is restricted to management and accounting and no effort as yet to extend it in the refineries.
- Only one of the three refineries (the newest) uses micro processor based control, in process monitoring, using turn-key HoneyWell System. There is plan to modernize the remaining two refineries and to introduce computerization of monitoring functions, with possible computerization of process control as well but on a turn key basis using Foxboro digital computer control system.
- There is future plan to computerize loading and unloading of oil products (using siemens systems).
- In some filling stations, micro computers are currently used to keep record of cash sales by key-to tape operation. There is a plan, for the near future, to link installed micro computer to pumps (for automatic metering and prices), and to a central computer for accounting purposes at KNPC offices.
- There is a plan to start Data base for inventory system.

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7. KISR Electronics Department

Meeting with Dr. Nabil Yasini and Mr. Abdul Hadi. Dr. Yasini offered a fast survey of what is available in Kuwait as electronics industry, went over KISR experience in development of certain microprocessor based applications and ended with some valuable recommendations.

- There is nothing serious as electronics industry in Kuwait.
- There are some software houses such as PACC (Pan Arab Computer Company), Al-Alanayah, and Agents of big names in computers IBM, NCR, etc. However in most cases the software used is adaptation or simple modifications of standard packages.
- KISR has good lab facilities in electronics but is unable as yet to develop its qualified personnel. There are difficulties in recruiting of experienced experts.
- KISR has very adequate computing facilities to service all departments' needs in management and in Scientific research. Maintenance is contracted to vendor company. However there is an effort to develop original software for specific applications.
- KISR has acquired important capability in development of micro processor based applications in the past few years. It has succeed in producing several prototypes, some with help of outside technical assistance and some developed by KISR personnel alone.

(a) First attempts were in cooperation with a specialized firm in USA [ ], results were the development of prototypes for an Arabic Telex and derivatives such as smart arabic typewriter etc...

The original designs were implemented into successfully tested prototypes, but effort at industrialization failed, lack of operational transfer mechanisms.

(b) The experience gained in design and implementation was very very important and tested again in the development of new successful prototypes such as, controller for data acquisition systems used in scientific and engineering experiments, Micro processor controlled display of flight information in Arabic at Kuwait airport and others.

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- The important strategy was to gain qualified expertise by assigning KISR personnel for several months to work in more advanced countries in actually designing and implementing new applications. "The accelerated know-how acquisition".
- KISR is also offering consultancy, testing, calibration and maintenance services to different industries and ministries in Kuwait.

8. KISR Director General: Dr. Adnan Shihab El-Din

Meeting was on 12 October, Dr. R. Abu El-Haj attended the meeting.

In the meeting there was a review of the mission findings in <sup>Kuwait</sup> Kuwait, and particularly in KISR. There was a review of the micro electronics work programme and the progress made in the preparation for the incoming experts meeting in January.

Dr. Shihab El-Din reconfirmed KISR commitment to host the meeting and to present a paper there. He apologised for not being able to provide a KISR staff to joint the mission in the first part but promised to consider that for the second part. He promised also to consider seriously further joint activities as may be recommended by the experts meeting.

9. The Organization of Arab Petroleum Exporting countries OAPEC

The meeting was on 13 October with Dr. Ibrahim Ibrahim, head of studies and research section.

- OAPEC is just starting to computerize many of its activities and to prepare a "data base system on all aspects of energy in all Arab countries".
- OAPEC organized in September 1983 jointly with "Abu Dhabi National Oil Company", ADNOC, a symposium on "Petroleum Information Management System" where major oil companies of the region were present. Many of the studies presented and of the recommendations proposed were very relevant to be considered. In partial the paper presented by Dr. M. Hanoush of ADNOC entitled "Petroleum Information Systems Management experience and overview". It was proposed that Dr. Hanoush be invited to attend expert meeting in January.

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- OAPEC is in close cooperation with KISR to establish their "data base" and their specific retrieval system.
- OAPEC is not involved as yet in any hardware studies or investment but may be ready to consider serious studies in this respect. They may be willing to sponsor studies related to the use of micro electronics devices and control in different phase of oil industries as may be proposed by the january meeting.

10. The Arab Fund for Economic and Social Development

The meeting was on the 13 October 1983 with Dr. Mervet <sup>Badawi</sup> of the Technical Section.

- The board approved a recommendation to computerize its activities in early October.
- The Fund is co-sponsoring with UNESCO and ALESCO, a study on educational industries including micro computer. It was proposed that ECWA and, may be UNIDO, could join the effort in this study.
- It was noted that micro processors and computers are present in most branches of educational industries and that the results of the micro-electronics programme in ECWA are very pertinent to Arab fund/UNESCO/ALESCO study.
- It was noticed that not enough information was available on all efforts to improve the use of Arabic language in Computer, and that there is a need to disseminate current and factual information on such efforts and on results acquired

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C- JORDAN

Many of the meetings attended were organized by the Royal Scientific Society which also provided some transport facilities to the mission.

1. Royal Scientific Society: (RSS)

The meeting was on 15 October with Dr. Hagop Paltikian, Director of the "Electronic Service and Training Centre".

- The Centre is a developed facility in equipment and personnel, offering technical assistance to all sections of RSS and also offering maintenance and servicing facilities of all electrical <sup>and</sup> but special electronic equipment, to enterprises outside RSS, specially to industries and medical institutions.
- It is a certified centre for quality testing of marketed materials and consumer goods ; it also provides calibration and standardization facilities.
- It provides consultancy, research and development and training services for industry, including development of specific application and manufacturing of systems.
- It offers customer-tailored training courses on all operation and maintenance of different electronic equipment and to improve performance of practicing technicians and engineers.
- The Centre has important effort in design and development of micro-processor based applications, an important application is a microprocessor - controller for traffic signal light. It is planned to develop a universal microprocessor controller, programable in EPROM, such development will optimize traffic light controller envisaged in the first phase to provide manually operated programme.

The Centre has developed and manufactured many electronic equipment, such as maintenance-free controller for windmill generator supplying power to electric pumps, amplifiers, lab testers, etc...

- The Centre is manufacturing, in limited scale, printed circuits, using facilities for automatic and semi-industrial production.

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- Dr. Hagop noted the:  
scarcity of technical information made available to people in developing countries.
- He emphasized the:  
continuity and commitment of his staff as a major factor in the development of the Centre.
- He noted that it was difficult to gain confidence of industries, that even now there is weakness of links with industrial private <sup>and</sup> or public sectors.
- Important attention is given to transferring techniques developed at RSS to industry for large scale production.

## 2. Ministry of Industry and Trade

The meeting was on 15 October with Mr. Fuad Manna', Department of Liscencing and Studies.

- No active electronics industries in Jordan
- Diffusion of computer application is still at its early stages.
- No specific plans to encourage electronic industries, but general laws that exempt most new industries from duties and income taxes.
- Need for diffusion of information on the benefit and practical application of microelectronic devices and computer.
- Need for regional co-ordination at market level to benefit from scale economy for new industries.

## 3. University of Jordan

The meeting was on 15 October at the Faculty of Engineering, Electrical Engineering Department, with Chairman Mahmoud Kamal and staff.

- The University offers advanced electronics theoretical courses covering most aspects of electronics, computers and communication ; but no specialization at under-graduate level. However, there is a plan to start a section for computer hardware soon.

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- In preparation for qualified and specialized staff, fellowships are given to students in specific fields, namely VLSI techniques. There is a feeling that this activity should be expanded to include variety of training places, to allow for up-dating the knowledge of staff.
- Conditions in Jordan as in other developing countries require that engineers should play the role of designer, technician, maintenance man, operator and educator, this explains the versatility of courses offered at university.
- Low salaries at university and RSS are encouraging a brain drain towards the Gulf region, producing deficit in qualified personnel in Jordan.
- There is some contact with industry, such as with telephone authorities, but not enough of it.
- The lack of opportunities for good industrial experiences should incite universities to give greater emphasis on lab work and workshop courses, as a minimal substitute, for their graduates.

#### 5. RSS Computer Centre

Meeting on Sunday 16 October with Dr. Yusef Museir, Director of Centre and member of ASMO Technical Committee on Arabization.

- The Centre has undertaken most of administrative and accounting activities at RSS and offers computing services to all departments.
- It offers consultancy, training and computing facilities to outside client and aspire to become the National Computer Centre of Jordan.
- It incorporates a 2 year community college for computer sciences, offering a 2 year diploma programme. It also offers a wide range of orientation and training courses to a variety of trainees and clients, including top management.
- It is mentioned that these courses are designed to remove "cultural shock" for end users exposed for the first time to a computer. They are designed to provide minimum self sufficiency for the client in operation and maintenance techniques of used software.

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- The Centre is following closely the diffusion of computer usage in Jordan. At present there are 52 vendors, 44 of which sell only machines with no substantial software, and with no local development of software. The Centre is planning, in cooperation with the National Planning Council, to conduct a survey on the diffusion of computer usages in Jordan, to construct a small data base, to identify trends and bottle-necks and assess efficiency in the use of available machines.
- The aim of the survey is to reduce the actual need for training institutions and for trained personnel. It is also expected that the survey will provide guidance to people interested in introducing computer application in their work, including availability of computing power at different institutions in the country.
- The diversity in equipment is creating a problem of compatibility and spreading available qualified personnel very thin.

#### Amplification and Standardization effort

- ASMO started in the standardization effort as of 1975. Several versions were proposed since then, the latest is Codar-U, 8-bit developed in 1983 ; a paper is to be presented to the January meeting on the subject.

#### 5. The National Planning Centre

The meeting was on 16 October with Mr. Sami N'sour of the Computer Centre.

- The Centre started in 1979 and is to offer computing facilities to public institutions.
- It also undertakes feasibility studies for public institutions when planning to acquire new computing facilities.
- It has medium capacity power, offers little original software development and is mainly interested with traditional tasks in public offices: accounting, payroll, salaries, management, etc...

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- There is no coordination with RSS on computing matters, nor with private or independent institutions.
- The Council is concerned with overall planning for large industries and is not involved with details in the choice of implementation of technologies used. It has no electronics industries in its plans.

6. The Jordan Phosphate Company

The meeting was on 16 October with Mr. Ziad Bakeer, Director of Electric Research Centre in the Company.

- Mr. Bakeer is among the very few people met who has received the questionnaire mailed by ECWA in July on micro-electronics applications and he is very interested in the subject.
- The Company is very large and uses all kind of control devices. However, all installations were contracted to big companies on turn-key condition including installation of needed monitoring and control devices. Mr. Bakeer estimates that there are many microprocessor-based devices but he is not sure of their nature or operation.
- The installation of modern microprocessor-based controllers improved tangibly the performance and quality of work ; however, the company lacks the qualified personnel to maintain or repair faults when they occur. Maintenance is not included in the installation contract and thus there are delays when anything goes wrong and the company has to call on vendor companies for any maintenance and repair job at very <sup>high</sup> expensive cost.
- He is familiar with other large industries in Jordan such as cement factories, fertilizers and potash, but no serious effort for coordination.

He suspects that similar conditions prevails there also, that there is a clear shortage in qualified personnel for proper operation and maintenance for newly installed modern controllers.

- Large industries are not aware that RSS carries maintenance contract for medical and other electronics equipment, and that it has the human capability and facilities to undertake maintenance tasks for industry.

- He felt that a 5-6 month training course for qualified personnel in operation, maintenance and repair of micro-processor based controllers and other micro-electronic device is badly needed for large industries using such devices now. He also appreciated the work of RSS in this respect and felt that the availability of well equipped maintenance company is badly needed throughout the region.

7. Jordan Lifts and Cranes Manufacturing Company

The meeting was on 16 October with Mr. Moris L. Sawalha, Managing Director.

- It is a private enterprise based on personal initiative and investment, the managing director has deep interest in <sup>it. He is</sup> his well aware of latest development, receives professional journals, attend international conferences and seminars, etc.
- He has been manufacturing lifts and cranes for five years using traditional controls; electro-mechanical switches, relays, etc. He is now contemplating seriously introducing micro-processor based controller to his products and contracted RSS to develop it for him. <sub>He thinks that</sub>
- The micro-processor controllers are not really needed ~~as he~~ <sup>thinks</sup>. They are introduced to impress the client and to keep up-to-date with advances in the field. The new controllers are expected to improve reliability and flexibility of controllers, may reduce burden of maintenance but are not expected to affect cost of installation and operation.
- The cost of development of micro-processor application is very <sup>high</sup> expensive for small industry and cannot be undertaken with <sup>out</sup> serious participation of government in funding R & D and giving incentives to industry such as tax exemptions, long-term contracts, assistance in training qualified personnel, etc.
- There is a need to disseminate up-to-date technical information on latest advances in technology and industry, because local industries lack proper channels for such information and lack industrial infrastructure and traditions that are usually a common vehicle in transferring information in developed countries.

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- He has great confidence in KSS and developed good working relationship that helped tangibly solving many problems faced by his manufacturing industry.

8. The National Computer Company

The meeting was on 16 October with Mr. Munir Kawar, Managing Director.

- It is a private hardware/software house agent of several big computers companies and offers software, maintenance, consulting services. It is specialized in turn-key systems for banks and finance company, but also offers application software and service facilities. He also offers software maintenance contracts.
- The company, established in 1979, has 60 installations by now and is considered among the largest in Jordan.
- As a software house the company uses standard packages purchased all over and modify them to local needs; they also develop local original software including needed I/O arabization for clients.
- The company has undertaken serious effort in word-processing techniques on ~~the~~ bilingual terminals, such as software tools for system development, screen management, text formation, etc.

It is ascertained however that no private software house is capable or willing to put necessary effort into further arabization because it goes beyond their common needs and it is not patentable.

- Some of his very interesting remarks on the diffusion of micro-computers for small businesses were as follows:

" Micros in the West are used by clients previously exposed to informatics using main frame and mini-computers, thus appreciating accurately <sup>the</sup> capabilities and limits of micro computers. Local clients are unfamiliar with informatics and many have reverse negative attitude at the first problem facing them.

In particular, local clients do not appreciate the real importance of software and are not willing to pay for it.

For the limited local market, micro software is far more expensive than the cost of the machine and with huge diversity of micros, software houses become even more reluctant to develop ~~need~~ micro-software.

necessary,

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Micros are not as yet mature products, changing very fast in capability and prices. Thus it is very hard for client to choose proper machine and may feel deceived very soon after settling for any machine

- However, it was ascertained that micros have a good market in education and particularly in public education, for there is a potential of a large market when necessary arabized software is developed. Large scale usage would justify the effort undertaken. It was also ascertained that micros in the form of high capability word processors have an important future in the region due to shortage of qualified secretaries; however, further effort is needed in arabization to cover needed functions beyond elementary regular text formats, such as some spelling corrections, etc.  
(text formatting)

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D. Damascus

1. Director General, Organization of Engineering Industries

The meeting was on 17 October 1985 with Mr. Mamdouh Mounajed.

The interview can be summarized as follows:

- No development of local hardware technology but only imported technology is used, coming from different foreign countries. Most industries direct their production to assembly lines only.
- Micro-processors are used as components in telecommunication industry only.
- Practically all industrial processes are manual or semi-automatic with very few digital machine tool control. No use of computer in industrial control.
- Micro-computers are used in the testing procedure for assembled T.V. sets.
- Computer is used for management only in large organizations (e.g. cable, steel, electronics).
- Expect to introduce 10-20 micro-computers to the organization, one for every company with a central software service in the organization providing training and maintenance to all these micros. Planning to have a micro in every company.
- Lack of information dissemination and understanding of benefits and usages of computers and micro-processors.
- The micro-computers introduced in every company should help <sup>in</sup> acquainting people with informatics.
- Large diversity of computers used and there is deficiency <sup>of</sup> ~~in~~ qualified personnel at all levels to develop needed software.
- Qualified personnel were usually attracted to more-paying jobs in private sector or outside the company.

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- No plans to manufacture computer in Syria now, for it is felt that technology secrets are kept protected by vendors. But plans to have a small assembly line for micros to train qualified personnel for good hardware and maintenance.
- Basic Need  
A training for software development, mainly of high level for trainers and training of practicing people to improve their performance.

2. Syronics: Syrian Electronics Industry

The meeting was on 18 October with Mr. Nazir Koussa, Director General.

- Assembly line for TV, black and white as well as colour sets, 26 inch., telephone sets and telephone exchanges of up to 120 lines.
- Manufacturing of certain parts and of components e.g. TV black and white screens, power supplies, plastic boxes, printed circuits, etc. Plan to increase the percentage of manufactured parts. Started with 10 % in 1979 and now achieving 35 %.
- Monopoly of produced equipment in Syria. Serve mostly local market with occasional small export.
- Consideration to manufacture discrete components in future but there are no plans for the production of integrated circuits.
- Type of contract with foreign licensors:
  - . Vendor is obliged to provide most components for a fixed number of products and for 10 years duration.
  - . Buyer may manufacture an increasing percentage of components and parts every 2 years.
- Small modification on assembly line for modernization with every new contract every year.
- Foreign company to provide training for personnel, secure good performance of assembly line and viability of products.

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- Right to manufacture product anytime in the future and sell it at international market at any price. Right to obtain advanced technology introduced during the duration of the contract.

Needs:

- Ready-made software packages for production management, accounting and storage.
- Modernization of research and development laboratories for training purposes.

3. Dr. Sallouta at the Ministry of Industry, deputy minister.

The meeting was on 18 October.

- All big industries use turn-key projects including all electronic controls. No plans for modernization. Among the industries you find: refineries, fertilizers plants, cement plants, etc.
- Some companies are introducing computer for maintenance, sorting and for storing of spare parts and products.
- Proposed applications of computers:
  - . Health service
  - . Education
- Computers already implemented:
  - . For monitoring and regulation of water flow in public ne work in Damascus.
  - . Plan to have it for regulation of electricity network.

4. National Statistical Centre/ The Computer Centre

The meeting with Mr. Mohammed Mahmoud Fattal was on 19 October 1983.

- Plan to acquire National Computer Centre Status.
- Services for all government functions and participation in establishing other computing centres for government; important processing of census<sup>data</sup> %

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- Plan to modernize and increase available computing power.
- Other computing centres in Syria: Ministry of Finance, Banks, Universities, etc.
- Plan to establish Data Base to service prime Minister's Office via terminals.
- Local development of software, (45 applications). There are four system analysts and 11 programmers.
- Willingness to renegotiate <sup>with UNIA</sup> the <sup>establishment of a</sup> regional training centre with Syria.
- Deficiency <sup>of</sup> in well-qualified personnel.
- Study a feasibility of computer networking in Syria (including Aleppo, Latakia), welcome an assistance of U.N.
- Arabization available only of I/O, done by vendors.
  - . Complaints about available printers (limited market and no serious effort done by vendors to improve performance).
  - . There are some good printers but of low speed and expensive.

5. Industrial Research and Testing Centre

The meeting was on 19 October with Mr. Hisham Sharafli, Director.

- Mostly a centre for industrial testing calibration but no real research and development.
- Centre established with the help of UNIDO in 1979.
- No computer problems in operation and maintenance of available equipment. Lack of qualified personnel.
- Development of a Technical Documentation Centre, but not computerized yet.

6. University of Damascus - School of Mechanical and Electrical Engineering

The meeting was on 19 October 1983 with Dr. Ahmad Azrak, Dean for Scientific Affairs.

- B.Sc. in electrical engineering lasts for 5 years including 3 years of specialization in electronics.

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- Very ambitious and modernized curriculum based on IEEE recommended text books (as reference), teaching in Arabic.
- Many courses offered are on advanced micro-electronics computer technologies.
- Graduate about 75 electronics engineers/year in preparation of future changes in Syria where micro-electronics devices will be used everywhere.++
- M.Sc. programmes specialized in computer engineered, micro-electronics controls and signal processing.
- Well equipped, well staffed, with strong government support.
- Good contact with Scientific Research Centre but no contact with industry.
- Many theoretical research programmes for development of micro-electronic application proto-types.

E. Egypt

1. National SGZ Computer Co.

The meeting was on 22 October 1983 with Mr. Taha Hussein, General Manager.

- Joint venture NBE/SGZ
  - A major software developing house in Egypt (60 people)
  - Concerned mostly with computerization of National Bank of Egypt (NBE) in all its operations. Same for Faysal Islamic Bank (with different types of banking operations).
  - Development of several other applications in management, industrial production and planning control, cost analysis, insurance etc.
- Projection: Hospital management (based on prior experience SGZ had in California).
- Effort to develop a local strong software team (100 already employed and 70 being trained) with emphasis on methodological approach to maintenance and further modification and development.
  - All their I/O is in Arabic

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- Specification, discussion of design and all users manual in Arabic, but programme documentation in English.
- Difficult to recruit good experience software personnel (attraction to Gulf State); train fresh graduates to build their expertise . Egypt has a good pool of manpower but need particular training, and methodology specific to the region.
- In software application development: market must be well defined and large enough to avoid prohibitive costs. No encouragement for micro's applications in small business.

## 2. Al-Ahram Computer Service

The meeting was on 22 October with Mr. Ali Ghuneim, Director.

- A big, old (1960) and profit-making computer service bureau mostly for management and accounting.
- Large value simple operations (for example, producing electricity bills for nearly all users in Egypt.)
- 90% commercial applications, 10% other applications.
- Many high software packages are imported with tailor made for consumers.
- Highly efficient and very busy, operate 3 shifts a day. 250 big companies in Egypt are their clients (including Air France's Egyptian branch).
- Training Centre:
  - Each year 2 programming courses of 4½ months duration are offered to their customers and to outsiders.
  - Special courses on IBM operation for IBM users only.
  - Special courses for Gulf States, tailored to their needs.

Al-Ahram's Documentation Centre uses computers only for index sorting, no real information retrieval yet. Are considering the use of Arabized STAIRS, but nothing definite as yet.

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Problems: - No public awareness of real value of software;

- Not enough qualified personnel (higher pay attracts them to Gulf States);
- Imported software needs to be modified to meet specific requirements of the region.

No recommendation for wide use of micro computers.

3. University of EIN Shams/Faculty of Engineering

Meeting on 23 October with Dr. Safwat Mahrous, Electronic and Electrical

Engineering Department and staff of Department.

- Up-to-date courses in electronics and computer sciences.
- Good equipment and laboratory; awareness of the staff of new developments in the fields .
- Some graduate research in digital control, data bases, local networks etc.
- Assembling computer for training purpose and development of prototype applications.
- Buying a class-fall of microcomputers (Commodore) for education and training purposes in computer sciences.
- There is a deficit of materials needed for further research and development (difficulties in import).
- Good relation with producing industries (steel and Iron) but poor with assembling industries; who are not interested in R & D.

No effort to develop digital control prototypes because there is no possibility of it ever being produced, but they have designed and developed a controller for Steel and Iron Industries.

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4. TEAM

Meeting with Dr. Sharrif, head of Computer Section on 23 October:

- A Pan Arab Software and consultancy house with experience in many countries of the region.
- Begin to develop software for many applications (Data Base Systems) but not enough of qualified personnel.
- Possibility to produce a study on "The State of Computer Application diffusion in the countries of the region, with special emphasis on Egypt: available equipment, software development, diagnosis of difficulties and problems, etc."

5. Electronic Industrial Centre for Research and Development

Meeting with Engineer Ibrahim Saleh Atyab, deputy director, on 24 October 1983.

- Mainly there to provide service to industry.
- Many laboratories are relatively well equipped.
- They conduct training and perform outside services.
- Development of certain prototypes, but since no industry was interested, ~~no~~ no production ~~is~~ followed
- Lack of good relations with university
- Very poor relation with industry
- Difficulty in recruiting personnel due to low salaries.
- <sup>Currently</sup> ~~Now~~ most electronic industry consists simply in assembling final products with no manufacturing of parts or components (everything is imported). Now, a 5-year plan to start (go back) to produce more and more components locally.

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- Provide maintenance and consultancy services to industry for all electronic equipment used
- Produce printed circuits for telephone industry and <sup>for</sup> ~~the~~ other industries: good facilities to produce good quality double-sided printed boards.

6. University of Cairo/Faculty of Engineering

Meeting with Prof. Talkan and staff of Electronic and Electrical Engineering Department on 24 October 1983:

- Good, up-to-date theoretical curricula.
- In contact and in cooperation with many universities in Europe and USA.
- Poorly equipped laboratory due to lack of finance and hard currency.
- Specialization in electronics and in computer science.
- <sup>MSc</sup> MSc programmes in microelectronics and computer engineering with many research projects carried jointly with Western Universities.
- No contact with industry: neglect in both directions.
- No serious tradition in industrial research at Universities or even in industry itself.
- University is a teaching institute rather than a research institute.
- Computer centre, located at Mathematics and Physics.
- Department in School of Science, services all university activities.

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II- Draft of Proposed Recommendation deduced from  
Mission on Microelectronics

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The order of the following recommendations does not  
imply priorities or any importance weighting.

1) For any applications in which it is necessary, or at least useful, to use Arabic characters a form of encoding must be used. If the encoded information is to be transmitted and/or processed in another installation, the coding should be uniform throughout the region.

Therefore, it is of utmost importance that a standard coding of Arabic characters be adopted and consistently used in all applications.

2) Organize an informative seminar dealing with methodology and technology of designing<sup>and</sup> implementing novel microprocessor applications. Particular attention should be paid to problems arising in transition from the realization of prototypes to industrial-scale production.

3) A training course should be given on the micro-processor use in the control and instrumentation field and on the relevant sensor devices such as analog sensors, digital sensors, analog actuators, digital actuators, analog-to-digital devices, digital-to-analog devices, PROMS, etc...

4) Commission a feasibility study on the possibility of establishing micro/mini computer production/assembly industry in the region. Such feasibility study should be correlated with the Arab Fund/UNESCO/ALESCO study on educational industries.

5) In order to improve the reliability of installed microelectronic control (and other) devices and the accessibility of maintenance services in this area, it is recommended that a regional maintenance and service company be established.

It is envisaged that this Company will be distributed in manpower and facilities throughout the region, based -wherever possible - on existing organizations. The only centralized part of the Company would be management and dispatch control.

Such Company, benefiting from economies of scale, could amass sufficient depots of spare parts and components, and access sufficiently large common pool of specialists. The necessary training would also be simplified by not having to repeat it in each country or even for each application separately.

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It is possible that with time, such Company may lead to establishment of assembly and, perhaps, partial production of microelectronic devices and microcomputers. The joint experience of Company's branches may constitute a real base for such expansion and proven track record of its services would be a good reference for future buyers of its products.

It is recommended that a feasibility study along these lines be commissioned.

6) The most urgent need in improving the level of computer (and microcomputer) usage in the region is that of establishing full-fledged indigenous software industry. This is particularly important for microcomputers which, by their very nature, are to be used by companies and organizations which do not, nor should, possess qualified programmers.

Because of the specific features of the market the only viable way for creation of such industry appears to be a joint regional effort whereby combined financial resources would provide the necessary investment, and combined pools of existing manpower (Universities, existing large users and software houses) - the necessary staff.

Among the prime objectives of such joint software effort one can envisage:

1. Creation of educational software in Arabic
2. Adaptation of important software packages for regional conditions, which includes , where appropriate, translation into Arabic.
3. Design and implementation of specific software packages (e.g. for Islamic banking)
4. Development of freely accessible software (e.g. for public health services)
5. Design and implementation of information retrieval systems in Arabic
6. Design and implementation of software for Arabic editing, indexing and referencing of free-format texts.

The structure for regional software industry may be similar to that for regional microelectronic maintenance company, <sup>i.e.</sup> joint management, investment and education/training scheme, with distributed centres of actual work execution.

It is strongly recommended that a feasibility study along these lines be commissioned as soon as possible.

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1. Upgrade the professional qualifications of specialists, particularly those engaged in training and education, and of upper management.

To this end, high-level courses and workshop/seminars activities should be organized on regional basis and in the individual countries.

It is particularly important to have such events for software specialists. In this case, the courses should provide an opportunity for serious practical work with ensuing evaluation of experience gained in practice.

To provide a permanent structure for such activities a regional organization should be created. This organization should be primarily concerned with management and planning of the upgrading activities.

Activities themselves could be subcontracted to existing educational and/or software organizations, drawing, when necessary, upon a pool of international experts.

2. Increase widespread technical information dissemination, exchange and propagation on regional basis and in each country of the region.

To achieve this objective, following actions may be considered:

1. Organize periodic (say, once a year) regional computer/informatics conferences.
2. Organize irregular workshops devoted to specialized topics of interest to all countries, or to a group of countries.

Note: All such meetings should produce technical proceedings.

3. Introduce the computer and microelectronic application sessions in regional and national professional meetings.
4. Establish a regional professional-level journal devoted to computer electronics and software. This may be prepared for by publishing a newsletter monitoring developments in the field, <sup>and</sup> emphasizing regional news.
5. Establish documentation and information service on electronics and informatics available throughout the region. It is recommended that this service uses an Arabized version of Isis <sup>515</sup> and/or <sup>5141.2</sup> stairs systems.

.../...

These actions would be greatly assisted by creation of a regional association of electronic engineers and informaticians which would provide a permanent infrastructure for the listed activities.

4) Increase the level of public awareness about advantages of the use of computers in all walks of life (management, education, health services, process control, etc...)

To this end, popular seminars and exhibitions should be organized easily accessible to non-specialists.

It is worthwhile to consider the possibility of producing a TV series on the use of computers, for example: an Arabized version of the BBC series, to be broadcast in all countries of the region.

