AUDIT OF THE EF WANG OFFICE AUTOMATION SYSTEMS

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1. COMPUTER SYSTEM CHARACTERISTICS

Hardware configuration: At present EF Division is equipped with the following WANG OIS (Office Information Systems):

(a) OIS-140-III (80.4 MB) Bldg 13-3-013
(b) OIS-PC, with 2 disk drives Bldg 13-3-013
(c) OIS-50 (10 MB) Bldg 14-4-006
(d) OIS-115-II (8.4 MB) Bldg 36-3-004
(e) OIS-115-III (8.4 MB) Bldg 530-R-021

All five systems installed on the Meyrin Site. First installation was an OIS 130 (10 MB) on a rental basis: 18 February 1980.

Operating system: WANG OIS: DOS rel. 9.92 and 9.E2
WANG PC: MS/DOS rel. 1.22

Applications software (installed):
WANG Digital Research CP/M
WANG 8-bit Word Processing, rel. 9.92 including:
- Automatic format modification
- Autom. repagination and footnoting
- BASIC Applications
- Calculator
- Glossary functions (macros)
- Horizontal scroll up to 158 characters
- Index Generator
- Messages (Mailbox)
- Paragraph numbering
- Scientific typing capab. (symbols & equations)
- Telecommunications: 3780 (currently used with IBM since July 1982) and TTY (with WANG PC), Typewriter hotprint

WP: 16-bit new high performance Word Processing Software (rel. 1.9), on loan for test (next release 2.4 will be billable), including:
- up to 8000 pages per document
- Horizontal scroll up to 250 characters
- SCI-TY (improved scientific graphic signs)
- Split-screen editing
- Text emphasis (several fonts in the same page)
- Text integrated with graphics
- "Undo" capabilities
- User defined dictionary
- Multi-column (until 7) with wrap around text

SCRIBTEL TRIAL2 Data Base, rel. 5.2C (a French translation from MAGENTA SYSTEMS List Management, London)
Other applic. available (but not yet installed)
- Automatic System Statistics
- Charter (Business Graphics)
- Mailway (large interconnecting system)
- PIC (digitized pictures in text) etc.
- Spelling Verifier
- WANGNET (high performance fiber optics communication system): X25, X200, X400 etc.
- WANG/Microsoft Corp. "Multiplan", Spreadsheet,
- DBase-III, Lotus1,2,3, Open Access etc.

Programming the device
The "end users" can (and do) program the device. Secretaries write their own applications "Glossaries" (macros) in Word Processing, and write data base applications.

Communications systems (currently used)
- WANG <--> CERN INDEX (3780 via an EXEC FILE)
- WANG EF <--> WANG EP
- WANG <--> IBM-PC world (off-line, diskettes)

- Mailway, messages and files (WANG <--> WANG): The OIS-140-III is connected via WANG WISE Box (Wang Inter-System Exchange) to our OIS-50, and also to the IBM via 3780 batch protocol. The PC is both connected via OIS-Emulation to our OIS 140-III and via TTY or 3780 to the IBM.

Communications systems available from Wang, but not yet installed
TELEX, TELETEX, 2741, 2780, 3780 batch communications, the 3270 family, TTY and OCR.
WSN (WANG Systems Networking) same as OSI (Open Systems Interconnection developed by ISO). File transfer, X25 (X200 and X400 also available). IDS (Information Distrib. System) WANG <--> IBM world and compatibles (MVS). Multipoint, Multidrop (with OIS and PC) and Point to Point. Auto-dialing and DVX (Digital Voice Exchange).

Some of these facilities are drastically needed (i.e. X25 transfer and communication facilities). The cost implications have, however, not yet been estimated.

Peripherals
14 terminals (intelligent workstations), of which 3 are in self service; 9 of the terminals show proportional text on the screen and can therefore accept graphics (by showing reserved space on the screen).

4 letter-quality 96 x 32 high density dot-matrix printers (5577) speed 40-60 cps (and 160-192 cps low-density). Width A3 landscape, 10-, 12- and 15-pitch fonts. They have also graphic capabilities.

2. FINANCIAL ASPECTS

Purchase costs
The first system was an OIS-130 (10 MB), which was on a 22 months rental basis. The total rent (inclusive maintenance cost) was £52,800.---. A buying back of £50,000.--- was finally negotiated, which gives a total price of £152,800.--- for this system.
Purchase costs (Cont'd) The rest of the to-day installed hardware (comprising the upgrade of the OIS-130 to an OIS-140-I, and then to an OIS-140-III, the other small systems and peripherals) amounts to: SF 335'445.45.

Therefore, the Grand Total amounts SF 488'245.45

Installation date First installation 18 February 1980.

Maintenance costs It is SF 47'148.-- for 1986 (and should be SF 47'736.-- for 1987), but we intend to study the possibility to remove the maintenance for the screens, which have very seldom problems. This would give a reduction of the maintenance cost of ~ SF 10'000.--.

All maintenance contracts are renewable as from 1st of January.

Software costs OIS software & installation expenses for 5 years approximately SF 3'000.--; Scribte TRIAL2 data base): (£ 1'800.--)= SF 5'400.--.

Other recurring costs Accessories, consumables (floppies, ribbons, not including paper) ~ SF 10'000.-- p/year.

Estimated lifetime At least 10 years for disk units and CPU. Printers and terminals possibly shorter. The system is modular and is repaired systematically piece by piece by means of the preventive maintenance contracts.

3. PERSONNEL INVOLVED

User community Approx. 30 users, of which:
11 intensive users (who depend or the system for their daily work, i.e. secretaries, data base users etc.).

Approx. 20 students & associates p/year (who depend on the system for their work during their stay at CERN)

Support personnel The main system has a system supervisor (who makes macros (glossaries, data bases etc.), assisted by three secretaries for routine inter-ventions “hot line”; but the other systems have all their own main user and/or supervisor. The system supervisor of EF Division also supports the Wang users of EP Division, upon request.

Hardware service Maintenance contract with WANG Geneva.

Software service WANG Geneva (a Software Service contract has to be negotiated soon to maintain the WANG “hot line facility”, which has recently been separated from the hardware maintenance contract).

Development The main supervisor develops facilities on request, but frequently secretaries develop their own word processing applications.
Development (Cont'd)  

Data bases are presently in preparation with the Scribtel TRIAL2 software.

4. FUNCTIONAL DESCRIPTION

Objectives of the system
The initial objective was first of all to avoid repetitive typing of scientific reports. However, it also brought with it an enormous help to rationalize text processing, distribution lists etc. in the Division.

General description
The use of the system has evolved to a point where virtually all the daily divisional typing and administrative tasks (secretariats, technicians, groups, sections, individuals) is done and kept on the WANG. The system is highly economic and has been shown to pay for itself every year in reduced requirements for temporary labour.

Services provided
Word processing: scientific typing 80%, the rest being telecommunication (almost daily transfer of SCRIPT files for finalization on the WANG systems), correspondence, Kardex, distribution lists, statistics and personalized applications.

It should be pointed out, that the EF typing secretariat is working for people of several divisions (60% for EP, 30% for EF, and 10% for others (like DG, TIS, DD etc.).

Language versions
DOS: Swiss-French
Word processing: Swiss-French
TRIAL2 from Scribtel: French

Current performance
Excellent. Systems run 24 hrs/day including weekends. Downtime 1/2 day every 6 months for preventive maintenance. We never had heavy problems (just minor program bugs, but soon arranged, or software fine tuning for some of the peripherals). Just one of the printers does not give complete satisfaction, but most probably because of users' deficiencies. All terminals are still reliable. A floppy drive of one CPU has recently been changed.

Technical limitations
Some limitations in access to the "Zip Code" for drawing our own special characters or the possibility to have very huge characters (i.e. for transparencies). However, this would need laser printers.

Planned improvements
- Acquisition of new 16-bit text editor WP+ (soon)
- Acquisition of 1 high quality (A3) laser printer
- Acquisition of 2 cheap laser printers (A4) (soon)
- Acquisition of a WANG PC (30 MB) (soon)
- Acquisition of 2-3 graphic workstations (1987)
- Acquisition of a streamer tape device for loading new generation programs and/or of a cartridge back-up system (soon)
| Planned improvements | - Installation of communication facility X25 (soon)  

5. **COMMUNICATION**

**Interchange of text**

Interactive via INDEX and WYLBUR: exchange of text including accented characters with other WANG systems at CERN is possible (also as soon as possible desirable with VM).

EF (and EP) Divisions have full, batch-mode binary file transmission capability (3780) which preserves all formatting information contained in the documents, not just the textual information.

Sending and retrieval of WYLBUR and NOTIS text requires tidying, but small "programs" doing some of this are available.

NOTIS, PHILIPS, AES, MacIntosh etc. users can receive/retrieve WANG text via WYLBUR.

Off-line text transfer (via diskettes) available for the IBM–PC (MS–DOS) world, but we never used it since yet.

**Bulk storage:**

Absolutely local. But a separate back-up facility would be very appreciated, since at present we need to stop the system each morning for removing the "yesterday" cartridge to save the data. The actual configuration is sufficient to support 20 more users without constraints and/or slowing down of the system.

**Non-local printers**

Wang uses "intelligent" printers which load material to be printed from a stack of queue files (fully transparent to the user). The dot–matrix and/or laser printers use a variety of soft–loadable (user definable) text fonts. The use of non–Wang printers is therefore not desirable.

**Use as terminal on other systems**

The facility exist from the constructor, there is just a question of need. All OIS systems (CPU) and/or some dedicated workstations, as well as the WANG PC’s can be used in this way for normal sessions and file transfer. A variety of terminal emulation packages (sect. 1) is available but not installed.
6. **SPECIFIC TEXT PROCESSING APPLICATIONS**

**Reuse of text or "throw-away" texts**
We systematically keep all documents since the first day of installation; unfortunately on floppy disks (which is a very weak material). Although WANG considers the life of a floppy for a maximum of two years, we have had very few losses of documents due to damaged floppies since six years.

**Document type & size, (average of pages)**
- Preprinted forms (1 page)
- Memos (1–30 pages)
- Correspondence (1–5 pages)
- Minutes of meetings (1–30 pages)
- Specifications (5–20 pages)
- Physics papers (2–50 pages)
- Yellow Reports (5–200 pages)
- Handbooks etc. (100 pages and more)
- Technical reports (5–200 pages)
- Distribution lists (1–20 pages)

**Requirements for:**

- **National characters**
  Wang word processing software can be obtained in "national" and "international" versions. At EF Division we opted for the Swiss–French package containing all German and French accented characters, with the corresponding Swiss–French keyboard (one keystroke) and display. Prompting is in French.

  Nevertheless, the constructor offers a wide variety of other characters/keyboards such as: Italian, Spanish, Swedish or Dutch etc. Versions for other major languages are also available, such as Chinese, Cyrillic and Arabic [right to left] (see attached example).

- **Symbols for Greek and Mathematics**
  The basic system supports a full second text font with greek and mathematical symbols. The scientific editor supports three full symbol fonts, which are visible on the screens of the proportional and graphics workstations.

- **Complex formulae**
  The WANG system has been precisely chosen by EF Division, since it was at that time (1979) the only one permitting to write easily the most complex formulae, not only "out of the text", but first of all "IN THE TEXT". It was also the first vendor offering a "twin head" daisy wheel printer with wide carriage for A3 "landscape" formats.

- **Text quality**
  WANG offers a complete range of printers: high-resolution dot-matrix and/or daisy wheel letter-quality; several laser printers with "typographic" quality (some for A4 "cheap" and some other for A3 "more expensive" formats). Both matrix and laser printers support proportional text fonts.
Other categories of cheap printers exist for the PC users (Brothers etc.).

- Table of contents standard.
- Index standard.
- Footnotes standard.
- Graphics merged Yes, but not yet seen on the screen. The new editor (WP+) supports this feature.

7. USER COMMENTS

User view Reliable and productive. Robust software. Everybody likes it. We have not yet found a more "easy to learn" and "easy to use" system; we would really be upset to have to change to another system.

I am prospecting regularly the market, and have carefully studied and compared the performance of several other systems (those running under C/PM or MS-DOS, as well as VM).

Strengths The system is a very efficient text-production factory which pays for itself yearly in reduced manpower costs. It is also increasingly used for divisional administrative functions such as list processing, although not for classical data processing.

The system is "secretary" user friendly (in contrast to "computer connoisseur user friendly"): all basic functions are menu driven or obtained from clearly marked function keys; the keyboards are made and laid out for fast touch typing and editing; there are no codes to memorise and training time is therefore minimal.

The system can be fine-tuned to the needs and level of each individual user, who immediately feels "at home" in her/his own environment (private libraries, utilities and applications).

Document selection and retrieval from the index requires one keystroke (no need for precise case sensitive re-typing of a document file name).

All word processing editing functions, including full document re-pagination and re-formatting, are very fast indeed.

Diskettes are only used for personal security archiving once a job is completely finished. But it seems the WANG ones have a longer lifetime than those of other vendors (Philips for example gives only a one year guarantee, and some of the secretaries using Philips have complained for frequent loss of documents).
Strengths (Cont'd)

System speed is practically independent of the number of users attached to it. The central file servers download software and user files to the intelligent terminals and printers. Routine fetching and saving in small chunks is automatic and invisible to the user. The system is therefore reliable and user robust.

The EF Division OIS 140-III (main system) has also been equipped with a "no-break" supply to prevent against mains variations, since there are lots of laboratories in buildings 13 and 14, where it is installed.

Deficiencies

The lack of "open" and on-line communication with other systems and the outside world (perhaps not so much a Wang limitation as a CERN problem, which we hope will be solved soon.

The limitations of the present 8-bit scientific editor (a better CAD-like and WYSIWYG editor will be available under the new WP+ editor on order).

The impossibility, at present, to consult or copy other data or information from within any running application - windowing (partial windowing will be supported by WP+).

The present "star" network (WISE) is costly for very large installations. However, an office LAN is available from Wang.

Wang OIS systems are tailored to word processing and therefore do not excel in data processing applications. The Wang VS Computers do both, and are used in computer-intensive administrative and data processing applications where word and data processing are of equal importance or where the number of simultaneous WP users exceeds 32. But such computers need a "full time" specialist (programmer/supervisor), which is not thinkable in small secretarial areas.

Desired improvements

The new text editor WP+ (end 1986: price SF 5'400.-- ) will provide many new and desirable facilities such as: support for a large character set with their attributes on screen and better formula display; in-text spelling verifier in several languages and subjects; in-text hyphenation dictionaries; in-text thesaurus; multi-level insert, delete and "undo" commands; graphics merged with text; multi-column word-wrap on screen.

WP+ will also extend the number of available character fonts in any one document from two to over forty and the number of pages per document from 120 to over 6000.

The acquisition, mainly for our secretaries, of some new terminals which support all the features of the most recent software products.
Timescale  Most of our wishes are budget rather than time
dependent, perhaps with the exception of "windowed"
applications which only partially exist.

8. RELATION WITH MANUFACTURER

Documentation  Wang application products are very well documented (in
English; availability of French manuals is poor, only for
basic training, but very well conceived and easy to
read). Support from Wang Geneva is sufficient but only
covers standard DOS and word processing. Wang
system documentation is not available to the users.

Training  WANG has made a considerable effort with its Training
Centre, which offers a choice of at least 30 different
levels of courses (from the beginner up to the
programmer analyst level).

Annexes:  Example of arabic
Example of scientific formulae