DATA FILES OF THE VIENNA CITY ADMINISTRATION

Foreword: Harry Swain

Translation: Helga MacKinnon

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For some years now, the City of Vienna has been transferring many of its routine data-processing activities to a computer-based system, in concert with the staged development of a management information system for the City's political and administrative leadership. The large number of up-to-date and well-controlled files offer opportunities for empirical research to IIASA scholars.

Through the courtesy of Senatsrat L. KOLOSEUS and a consultant in his office, Mr. P. MARTIN, a copy of the inhouse data listing was made available to IIASA. Should there arise a need to use these data in the Institute's applied research, Senatsrat KOLOSEUS has expressed his willingness to help in negotiating an arrangement with the City which would allow their use for research purposes, subject of course to the preservation of the confidentiality of individual respondents. Interested IIASA scholars should contact the Urban project leader in the first instance.

I should like to take this opportunity to thank Senatsrat KOLOSEUS and Mr. MARTIN for their generosity, and Mrs. H. MacKINNON for her able translation of the remainder of this internal working paper.

A. Evolution

The use of EDP facilities for the administration of the City of Vienna was started in 1960.

In the beginning standard BULL card punchers with a Gamma 3 computer were used, which could be coupled with a tabulator as well as with a card duplicator. Programing was done by switch plates. The first area to be handled by data processing was the old age pension scheme (superannuation scheme). Subsequently, the wage calculation of other income groups and the voting register were changed over by EDP. On the occasion of the 1962 parliamentary election print-outs of the voting register for 3 electoral districts were made available for the first time. For the presidential election in 1963 print-outs for 5 electoral districts were produced. Since the elections for aldermen (the local government) in 1964 voting registers for the entire Vienna metropolitan area were produced by EDP. One other task to be tackled by conventional card punchers was the assessment of water rates.

In 1965 the first EDP unit with internal program storage, a BULL-Gamma 10, was put to use. A second unit of this type started operating in 1966. While no external storage facilities for the Gamma 10 were used, the EDP unit put to use in 1966 of the BULL GE 415 type was equipped with external magnetic tape storage facilities which considerably increased the output.

The BULL units were applied in the following fields: rent lists for public housing; compulsory school age data; wage calculation (accounting) for caretakers of public housing.

The EDP units installed on the premises of the city hall (Rathaus, Stiege 7, ground floor) together with the operating, organizing and programing staff formed a sub-department of the municipal council until March 15, 1971, called 'Electronic Unit'.

The development of a more efficient automatic data processing unit opened up new spheres of application. This initiated a comprehensive survey on the feasibility of applying EDP in the administrative management of the city.

Already in 1965 the consulting firm "Data Service," a subsidiary of the 'Zentralsparkasse der Gemeinde Wien' was called in to prepare--in cooperation with Rathaus departments--a long term proposal for organising the implementation of a municipal information system (MIS) which could be a guideline for the City of Vienna. The concept of MIS envisages the automation of the following branches of administration and the use of data stored in data banks for informing the political management and the higher levels of administration: finances, personnel, real estate, commerce and trade, planning. Up to now this concept serves as a guideline for developing new projects of automatic data processing. Among the aforementioned fields the transfer of finance and personnel has proceeded furthest.

The process of changing other administrative fields to EDP data processing shall continue according to the original concept, which envisions a means of information and data availability of greater and farther effectiveness than any that has been used so far.

The personnel requirements for using EDP in the most up-to-date way were met by forming the sub-department "Office for

Administrative Techniques and Organisation" (BVO) within the jurisdiction of the municipal council by virtue of the MD decree 98/68 of Jan. 9, 1968. At the beginning of their work the staff of this new sub-department converted a number of minor fields to EDP for training purposes. This included the following projects: coordination of road regulations; surveying programs; assessment and evaluation of applicants for public housing; statistics of premature births; anniversary calendar; heating cost calculation and accounting of market fees.

In order to carry out the projects envisaged in the long-term organisational plan it was necessary to acquire a large scale computer system. 7 EDP companies were invited to put in bids (Burroughs, BULL, Control-Data, Honeywell, IBM, Siemens, UNIVAC). After carefully screening the offers of 5 firms (Burroughs and Control-Data did not participate) the order was placed with IBM. In June 1970 the IBM 360/25 EDP unit was installed at the MD-BVO, on which the projects developed by BVO were implemented. This relatively small unit was meant only as a transitional expedient up to the installation of a large central system.

By virtue of the MD decree 974/1 from March 15, 1971, the sub-department MD/BVO and the "Electronic Unit" were merged to form the new sub-department MD-BOD (Office for the Organization of Automatic Data Processing).

As the projects defined in the municipal information system developed further, a large scale computer system became necessary by 1971. From October 1971 onwards time was rendered on an IBM 360/50. In October 1972 a large scale computer system of the IBM 370/155 type was installed. In May 1973 the IBM 360/25 was phased out, after all pro-

grams handled by the unit had been adapted to the large system. The BULL units still operating at present (Gamma 10 and GE 435) will be phased out by midyear 1975. The programs running on these units are presently being re-programmed.

B. Present State of BOD

B.1 Projects of BOD

Presently BOD works on 65 projects in various spheres of administration. Among those, about 30 projects have been completed apart from current operational service no further organisational and programing work is required for them. These projects have allowed for considerable streamlining in the administrative processes. In 1973 approximately 11.5 billion Austrian Schillings were handled by EDP.

The remaining 35 projects are still being developed and will be completed on schedule according to the BOD medium-term project plan. After completion of these projects the fields of wage calculation, fees calculation, public housing, personnel, and parts of building activities will to a great extent be handled automatically. The first phase of the municipal information system can then be considered completed.

On the following pages, a short survey of the abovementioned projects is given.

Wage Calculation of MA 3

For calculating the wages of employees of the City of Vienna, MA 3 uses 8 categories:

	Number	Run on Computer
B - Civil Servants	18,000	BULL GE 435
C - Contractual Teachers	2,000	BULL GE 43
D - Contractual Workers	10,000	IBM 370/155
E - Contractual Employees	10,000	BULL GE 435
G - Retired Civil Servants	20,000	BULL Gamma 10
L - Teachers with Civil Servant Status	6,000	BULL GE 435
P - Retired Teachers	6,000	BULL Gamma 10
S - Seasonal Workers	not yet done by EDP	

Apart from gross/net wage calculation (pay slips) all annual documents are prepared, such as wage accounts, pay slips, book-keeping, and finance statistics. Wage calculations can be made for all previous months in the year of accounting and for the last two years. On the basis of monthly wage calculations, the sums total for MA 6 are completed.

Upon request by MA 3 statistical evaluations for special purposes are given (e.g., promotion scheme of Vienna's teachers). For civil servants to be pensioned off the level of the pension is determined on the basis of their salary plus supplementary payments. 73,000 employees, of which 72,000 are accounted over EDP approximately 1,000 annual notices on punch cards.

Yearly turnover: 5,993 million Austrian Schillings (1972).

Wage Calculation of MA 3 - Change Over

The wage calculations presently done by different software packages and on different equipment will be consolidated into a single program system on the EDP unit IBM 370/155. In addition to the present technical scope the computer handles the advance accounts and the automatic transition of persons from active wage category to retired category with simultaneous printing of the retirement notification.

When this transformation has been completed, the system shall be extended in the following way:

(a) assistance in drawing up the personnel budget
(b) registration of all supplementary fees of all departments by an optical character reader (for facilitating and accelerating the collection of data)
(c) set-up of a personnel information system
(d) enquiry possibility via terminal
(e) immediate accounting by terminal in cases of persons terminating employment.

Registry Office

The registration of changes in legal status for the personnel data bank and the acceleration (speeding-up) of writing out birth, marriage and death certificates was tested with an "intelligent" Nixdorf Terminal 820 at the Registry Office in Penzing.

With the experience gained there, and improved programs, runs, and facilities, the system was put into full operation at the Registry Offices of Penzing, Ottakring, Währing, Favoriten, and the Inner City during 1972.

On 6 Nixdorf computers, about 72-75 percent of the total number of birth, marriage and death certificates in Vienna, which is about 66-70 percent of the entire work load, are written much faster now and are stored in the data bank.

The remaining cases handled by the registry offices are centrally stored on 3 Nixdorf computers where also the necessary corrections are made and the registry staff are trained to operate the terminals.

Annually about 16,000 people and approximately 17,000 births, approximately 27,000 deaths and approximately 12,000 marriages.

Voting Register (Register of Electors)

Essential data stored: name, address, birth dates, constitutency, (occupation).

Major processes:
Continuous (periodical) amendment service
Printing of voting registers and addresses
Compiling of age statistics
also:
Evaluation of the election results of presidential, parliamentary, local and district elections.
By products:
Annual printing of lists with pharmacies on night duty, including the addresses,
Section of addresses for opinion polls.

In 1972 and 1973 the MA 62 and IBM together compiled the draft concept for the reorganisation of the voting register of IBM equipment. In April 1974 the draft concept was further elaborated and adapted to the new legal situation. Personnel savings of 18-20 persons.

Data from 1,300,000 eligible voters.

Personnel Data Bank

Set-up of a personnel data bank from data provided by
- household lists (questionnaires filled in by all households)
- registry offices
- voting register

Organisation of the
- current correction service
- enquiry service
- protective measures

Purposes:
(a) Running a central personnel register for the administration work stipulated by legal regulations.
(b) Evaluations for planning tasks, e.g., nursery schools, schools, hospitals, homes for old people, etc.
(c) Statistical evaluations,
(d) Improving communication between the levels of civil servants and political decision makers.

1,700,000 Viennese

Household Questionnaires

A compilation of data on the legal status of persons and firms was carried out in 1970 on about one million people; the data was recorded by EDP together with the corrections of the voting register and registry data.

In December 1972 the questionnaire forms and the procedure was tested on five thousand people in selected test areas; the result was positive.

In the summer of 1973 forms for establishing the legal status of persons and firms of the Vienna population (approximately 1.7 million) were prepared and printed on the basis of the voting register. This step was successfully completed in the autumn of 1973.

The EDP Committee suggested not to print the income tax forms.

In April 1974 the household questionnaires were brought up to date by supplementing and correcting the data so far compiled.
Advantage: The individual households are relieved of paper work, the administration gets the most and latest data on a questionnaire which is at the same time suitable for data processing.

Data from approximately 1,700,000 inhabitants (First Form) and partial data from approximately 600,000 inhabitants (Corrections).

Estimate and Budget

In the course of the annual preparations and enquiries in connection with the budget estimate for the City of Vienna, BOD carries out the following tasks:

1. Recording the new draft estimate
2. Continuous corrections of the proposals from the civil servants and the municipal council.
3. Preparing the draft estimate in book form with:
   - listed budget items plus comments,
   - sums total,
   - sums of the individual columns, with income and expenditures listed separately,
   - statements of investments.

Advantage:

- daily reports on the results of budget consultations,
- the draft estimate is automatically printed after completion of the preparatory work.

Proposed budget of the Aldermen's Councils of the City of Vienna (approximately 50,000 proposals).

Users Dues

The current payments in connection with the users dues, payable once a year, are requested by an automatically printed statement which takes into account existing credit or debit balances. The directives are noted according to rate groups as well as in an objective manner.

In default of payment monthly statements of arrears are printed. Account deductions can also be made by remote data processing.

Advantage: The 35,000 personal accounts maintained with the municipal cashiers were closed and are now stored on the computer.

35,000 accounts; turnover: 16 million Shillings.

Real Estate Duties

Data on real estate taxes, and the duties for refuse disposal are stored in such a way that the necessary corrections can be made, which are effective retroactively, in the present and the future. Based on the notifications of changes from the various departments the assessment of the real estate tax and refuse disposal charges is automatically made. An automatically printed quadrennial payment order informs the taxpayer of the balance of his account and the amount payable. When the collection order has been placed the amounts are transmitted for accounting by magnetic tape to the "Zentralsparkasse der Gemeinde Wien." For accounts showing a debit balance the statements of arrears for the collection are prepared according to the due dates. Payments can also be made through deduction from bank accounts by use of the terminal.

Advantage: 137,000 real estate accounts so far maintained with the municipal cashiers were closed and are now handled by EDP. From the data stored on refuse collection duties statistical evaluations on sites, number of garbage bins, etc., are automatically made. Statistical evaluations for the financial administration are being prepared.
Collection of payments by banks was introduced.

137,000 land owner accounts; 10,000 annual changes
Annual turnover: 523 million Shillings

Dog Tax

The dog tax payable in Vienna for keeping dogs at present amounts to AS 100 - per dog annually and the dog owner receives an invoice prepared by EDP. For each dog owner an account is maintained in a data bank. When the payment has been received a licence number and dog tag are issued.

In default of payment a reminder (demand note) is automatically sent and eventually a statement of arrears for collection procedure. Statements of account can be retrieved by remote data processing by feeding in the account number or the dog tag number.

Advantage: 42,000 accounts maintained so far with the municipal cashiers were closed and transferred to EDP.

42,000 accounts; 4.5 million Schillings annual charges approximately 18,000 annual changes.

Assessment of Water Rates

In assessing the water rates one balance of account slip and three partial payment orders with the necessary bookkeeping entries have to be prepared for each account once a year.

The water rate accounts are stored by EDP in such a way that they can be made available to the individual departments for output or input purposes by terminal at any given moment, with the

- MA 4/6 giving the assessment data
- MA 31 giving the data from the hydrometer
- MA 6 giving the actual (net) calculation data.

Based on the inputs of MA 4/6 the corrections of basic data are made. They are furthermore used for printing the hydrometer reading lists, official notifications and statistics. The hydrometer data are fed by the MA 4/6 into an optical character reader on paper tape.

Advantage: 100,000 water rate accounts so far maintained with the MA 4/6 were transferred to EDP. The system of programs permits control over the amount of water consumed and for statistical analyses.

100,000 water accounts, 110,000 readings a year 15,000 - 20,000 corrections of basic data; 100,000 Notifications of annual amounts of approximately 540 million Schillings.

Water Rate Net Calculation

Bookkeeping (accounting) of water rates is automatically done by EDP by using the data bank set up for assessing the water rates. By storing the net calculation data the balance of account slips and partial payment orders show any credit or debit items. In default of payment a statement of arrears for the collection procedure is issued.

Advantage: 93,000 accounts maintained so far with the municipal cashiers were transferred to EDP.
Collection of payments by banks was organized.

93,000 accounts annual turnover 540 million Schillings
Movement approximately 1.2 million a year
300,000 debit items per year.

Accounting of Market Stalls

For the monthly accounting of market dues the following tasks are carried out by EDP:

(a) Accounting of payments for the past month and printing of statements of arrears,
(b) Changes in the basic data and changes of assessment for the current month,
(c) Compiling the rate list, printing the demand notes and dues for the following month.

Approximately 2,000 market stalls to be billed
Yearly assessed sum approximately 19 million Schillings.

Commercial Building Lots

The firms applying to WIBAG for building lots are recorded with consideration to the desired site, size of the firm, type of enterprise, required supply facilities, and emissions to be expected. Statistical evaluations of the collected data should facilitate the decision making process for allocating building lots.

Approximately 500 companies

Notifications and Statistics of MA 68

The data gained from emergency service reports is stored on magnetic tape in the MA 68; on this basis the bills for such services are printed by EDP. Also registered payment orders are printed by EDP. Statistics are compiled on the collected emergency service data (according to the emergency vehicles, to the type of service, duration of service).

Advantage: Immediate recording of services by EDP allows for prompt issue of invoices. This greatly reduces the number of defaulters. The collected data is automatically evaluated and made available to the officers in command of the emergency service, which has led to more economical planning of the service facilities.

Approximately 20,000 notifications per year
Set amount approximately 4.5 million Schillings

Anniversary Register

The EDP anniversary register of the MA 9 has stored data on all Viennese celebrities back to historical times. Between 500 and 1000 changes are due each year. The municipal council, (City Council) usually sitting in October, which decides on anniversaries, commemorative medals, and similar issues to be observed the following year, is presented with an anniversary catalogue, listing all personalities for whom an anniversary will be due in the forthcoming year. In 1973 the project was transferred from the BULL unit to the large-scale computer IBM 370/155.

Advantage: The complicated manual register and preparation of proposal lists becomes unnecessary.

Approximately 10,000 people

Records of Compulsory Education (Record of School Age Childen)

Essential data stored:
Name, address, year of entry, school presently attended, class, school, career.
Major processes:

Regular amendment service
Printing of class lists
Printing of school career tables
Printing of alphabetical lists of pupils
Compiling of school career statistics

Data approximately 170,000 students

Permanent Relief Payments

To persons receiving relief payments specific amounts of money determined by the MA 12 are paid monthly by EDP. The money can be sent by postal order, deposited on an account or collected directly in cash from the district social department.

Advantage: By implementing the allocation of payments on EDP facilities it was unnecessary to acquire an automatic accounting machine (MDT costing AS 700,000) and a higher degree of automation was achieved.

7,000 people; annual relief amount approximately 115 million schillings

Nursing Homes' Accounts

This project controls the automatic accounting and collection of charges for the nursing homes of the City of Vienna. In the electronic data bank all personal datum of the inhabitants is stored; the data is processed and evaluated by a complex system of programmes.
On EDP are also the following programs:

- computation (calculation) of the nursing rates;
- collection of the nursing rates;
- accounting for each case;
- bookkeeping of the payments by relatives;
- transfer of pocket money (MA 12);
- listing amounts requested (by each inhabitant)
- printing of coin lists and payment lists
- exchanging information with those bearing the costs.

Advantage:- Interest gains on the money collected and invested by banks and credit unions;
- greater security for the patients.

No. of accounts: approximately 10,000
No. of nursing home patients: 7,000 - 9,000
No. of changes: 1,000 - 1,500 per month
Turnover: 180 - 200 million Schillings

Accounting of General Nursing Rates

The program system for accounting the nursing rates of hospitals of the City of Vienna prepares the individual invoices classified according to hospital and payee.
On the basis of these data, lists with the total amounts control sums are compiled and lists of credit items are printed.
From the accounting data statistics on nursing services are compiled for the MA 17.
Since 1974 statistics on the lengths of hospitalization have been prepared for use by the Office of the City Council.

Monthly approximately 15,000 accounts
150,000 patients approximately 3.2 million patients under care; approximately 570 million Austrian Schillings nursing care fees per year.

Record of Premature Births

Data on the case history of premature births (and risk babies) are stored and statistically evaluated according to a given questionnaire. The project was developed in cooperation with the Gottfried von Preyer Pediatric Hospital, and for the last three years attempts have been made to include other hospitals (also in the provinces) into the system. When the project was handed over directly to MA 17 in May 1973, a total of 4 hospitals were incorporated.

Advantage: For the first time all factors and indicators decisive from the medical viewpoint for premature births were recorded and made available to prophylactic medicine.

Approximately 1,000 cases a year (only at the Preyer Children's hospital)

Urologic Documentation

Case history documentation for urological departments was introduced, but is presently still confined to basic documentation. The project was developed jointly by the MA 17 and the Department of Urology of the Wilhelminen Hospital, and is supervised by MA 17.

Advantage: Uniform recording of case histories of the largest Urology Department of Vienna. Thus a representative amount of data for medical analyses is made available by EDP.

Documentation on Medical Data of School Children

Data of Viennese pupils (height, weight, date of birth) attending the fourth class of elementary school in 1970/71 were compiled. Subsequently various statistical evaluations on the overweight of these children (obesity statistics) were made. The project was a one time action and was completed.

8,000 units

Coordination of Measures Relating to Roads

The City of Vienna plans and implements each year about 8,000 measures relating directly to traffic areas. Between 5,000 and 7,000 of them need coordination because they hamper traffic or present a nuisance for the population. The first information on the measure is circulated as soon as the preliminary planning process allows for a clear idea on the start, scope and duration of the activity to be carried out. After the final notice has been given a three year restriction for digging up the road in question is issued by EDP. The various notices are stored by EDP and lists classified according to various criteria are printed on the first, tenth and twentieth of each month. At a later stage of development the periods of quarantee coverage are recorded and the departments and firms are automatically informed before the expiry dates.

Approximately 12,000 announcements are handled.

Construction Register of MA 28

In the construction register of MA 28 kept by EDP the annual construction work of the road building department and the accruing expenditures are recorded and stored separately by EDP for each project. The data from the coordination of road construction activities are then supplemented by data on building rates and actual costs. EDP provides evaluations of data sorted according to areas and costs for each project. The annual balance is also automatically settled.

Advantage: It becomes unnecessary to keep the construction register by hand and automatic flexible means of evaluation are provided.

Annually approximately 1,000 street building related projects.

Road Surfaces - Municipal Roads

The data bank on road surfaces contains data on the types of surface of all road sections within the 230 map squares of Vienna. These data are supplemented annually by MA 28 in cooperation with the engineering firm Balogh.

For each road use category (road track, parking space, pavement) 12 different types of surface are listed together with the area covered by each and additional data (canalization trenches, guard rails, supporting walls).

From the electronically stored data on surfaces of municipal roads and information on the construction activities of MA 28 annual statistics are compiled. They include:

(a) changes in the categories of surfaces,
(b) performance evaluation of new road surfaces,
(c) evaluation of repair works.

Apart from statistical evaluations MA 28 can request print-outs of data on the map squares, road sections and road systems.

2,500 km. public thoroughfares (15,000 stored units)

Land Use Pattern

For the project "land use pattern" aerial photographs of the entire City area were taken and broken down into 36 land use categories. In the densely built City area the photographs were taken block by block, in the marginal (suburban) areas for each map square separately. The data available can be machine read and are to be used for various purposes of City planning. The electronically stored land use pattern of the City area is the framework for a future planning data bank into which all data relevant for planning stored in the implementing data banks are to be incorporated.

Land use of entire city area in 36 land use categories 1,267 units, in the closely built up area approximately 5,000 blocks.

Physical Reference System of Vienna

The physical reference units (district, map square, map areas, block area) as well as the junctions of the road network are entered into a coordinate system and stored in the data bank. In parallel a data bank of all Viennese addresses will be started. This will for the first time make it possible to combine available information for any local concentration and to present it graphically.

Advantage: The following tasks are to be carried out by means of the automatic plotter:

- short term drawing of a new City map
- keeping track of the various construction projects of the different departments
- supporting the planning departments
- drawing maps on the basis of the data stored by the computer on persons, finances, building lots (structural data) for providing illustrative information.

1,264 map squares to be accounted; 10,000 blocks; approximately 15,000 junctions (size of grid approximately 3,000 km.)

Road Index

For this project a data bank was established on all traffic areas, traffic buildings, parks, allotments, housing estates, water bodies, topographical features, railway lines, and railway facilities. A numerical code was assigned to each of the abovementioned terms at the conception, which will be entered on the plan and will determine the exact land use. Traffic areas are classified according to district, map square, and smaller units. A printed copy of the road index is periodically sent to the departments of the City of Vienna.

Advantage: The project allows for screening of the address data, uniform codification, and streamlining of the official procedures, it facilitates administrative integration and is a basis for the physical reference system of Vienna. (See project DD2DG, page 30).

Approximately 6,000 public thoroughfares on a 2,500 k.m. area of the city.

Road Data Bank - Federal Roads

The federal road department is requested by the Federal Ministry for Construction and Technology to draw up annual lists reporting on the changes in the existing network of federal roads. BOD is developing an organizational concept to supplement the EDP material on roads available at present with further data relating to the administration of federal roads. At the annual date fixed for the report the changes of the Vienna network of federal roads are stored directly on magnetic tapes and fed into the data bank of the Ministry for Construction and Technology.

Federal road net of the Vienna City area.

Traffic Models

The planning department of the City of Vienna has for years been using simulation models for public and individual traffic.

Based on the results of studies on the technical and economic aspects of traffic, the future development with a view to time and space requirements and its dependence on present structural conditions are computed. Furthermore a calculation model for making traffic forecasts (predicitions) including public transport, park and ride traffic, and individual traffic is being developed.

With a view to better coordination of transport companies calculations were made on the coverage (occupancy) of the public transport systems of Vienna, Lower Austria and the North Burgenland. The results serve as a basis for regional planning of transport.

Whole traffic network of Vienna (approximately 2,500 streets).

Concept of Sporting Facilities

In 1970 data such as address, dedication, legal land ownership, utilization area, and category (type of sporting facility) on all Vienna sports grounds were recorded and stored on magnetic tape. From these data 13 different evaluations have so far been made and put at the disposal of planning departments.

In 1973 ransom sample enquiries on the sporting habits of the Viennese population were carried out and the results stored by EDP. Linking those two types of data can facilitate the decision making process for a concept on sporting facilities in the City of Vienna.

Approximately 700 sport facilities in the area of the city of Vienna.

Simulation Model POLIS

The simulation model POLIS serves as an expedient for decision making for long-term planning of urban development. The City of Vienna is seen as a complex dynamic system of social, economic, and technological relations which changes its physical and temporal dimensions.

The various zones of Vienna and the surrounding area are linked by the present transport and traffic system. Changes in the urban system are effected in several stages. The state of the individual zones is represented in the model by stock data such as inhabitants, place of work, buildings and areas.

The model simulates the development of the physical distribution of inhabitants, place or work, buildings and areas as well as the transport connections between them under the impact of planning measures of the city administration over several periods of time up to a certain horizon of predicition.

Division of the city areas, as well as immediate surrounding areas into 90 zones.

Statistics on Building Production

From the data on building production stored in BOD on magnetic tape since 1961 (new buildings, enlargements, alterations, additions, demolition) evaluations are made according to various criteria serving as a basis for urban planning. The stock of data is increased annually by MA 66 and evaluated by means of existing programmes (IAFAED).

Since 1961 approximately 26,000 building measures of superstructures.

SO_2 Analysis

The data continually measured by a sulphur dioxyde meter, 48 half hour means per day, are recorded by BOD and are analysed as follows by a programme uniform system in the entire federal territory:

- maximum and minimum half hour means per month
- maximum and minimum daily means each month
- monthly means
- periodic and annual means
- values exceeding the emission limits of TAL and VDI guidelines 2108.

Advantages: The EDP programme is sufficiently variable to allow for investigation of other emissions.
Automatic graphical presentation of statistical evaluations on charts by EDP is possible.

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1 measuring station; monthly and semi-annually.

Planning of Objects, Technological Stocktaking and Continuation

The programs and program systems listed below are used either in the planning or construction stage of projects or applied in the stock-taking and continuation of geodetically measured objects (also building lots).

- controlled (fixed) land registry of Vienna
- future prospects of building projects
- geodetic land surveys
- trigonometric height measures
- photostatic computations (Vienna City Map 1:2000)
- polygon point location land registry
- geodetic beginnings and continuations
- survey of tunnelling for the first and second Viennese watermain.

Advantages: The data collected during construction can be used for various purposes owing to electronic storage, and are thus elements of a data bank for urban planning and real estate register.

Streamlining MA 48

The MA (urban cleaning and vehicle parking lot) shall serve as an example for a systems model for municipal departments organized as an enterprise.
This model consists of 5 sub-projects:

		Implementation:
(a)	vehicle administration	100%
(b)	materials management	30%
(c)	order cost calculation	0%
(d)	personnel administration	20%
(e)	log books and trip licenses	20%

A list is kept on all vehicles belonging to the municipal authority and the official licence plate, request for test result forms required under Section 55 of the vehicles examinations act are issued.
By recording the work of the garage staff, the petrol and oil allocation, the log books and all materials movements, evaluations can be made on

- vehicle estimation, capacity coverage and periods of non-use,
- operation costs, mileage
- costs per vehicle and vehicle type, order
- department and cost centre
- duration and type of repairs
- working hours of staff

and data for the cost calculation centre and the coordination of work department are provided.

Apart from compiling catalogues on materials on stock and prices, the warehouse stocktaking is carried out, which helps to keep track of items on stock and is a basis for ordering; also the invoices of orders are printed

automatically.

3,000 motor vehicles, 400 people, 4,500 material positions 10,500 AS - fuel, 90,000 work orders, 5 million AS warehouse value, 3.7 million km., 400,000 personnel used, 150,000 materials moved, 5000 orders, (AS 15 million)

Electronic Building Rate Calculations - Accounts and Control

The output of the builder is recorded at the building site into the BOD EDP, and is automatically compared and calculated with the tabulations of the builder. The computation of the building development and the work output can be established at the beginning. This classified performance record is stored and accumulated monthly, and the factor costing takes into account change in the per unit cost. In this manner the present, as well as the final costs as established by the builder can be analysed at each stage as the building progresses.

Advantages: The EDP gives a short term view of the unit cost of the building. At the building site specialized personnel is free to supervise. The short term cost calculations lead to a simplification, and give an overview of price and wage fluctuations.

Monthly billing Statistics of 38 building sites
Annual turnover 1.2 billion Schillings

Pipeline Warehouse Baumgarten MA 31

Using the framework of the program for warehouses, the following figures were computed for the pipeware house Baumgarten in the municipal area 31 -

(a) automatic storage (movement costs)
(b) automatic evidence of the numbers (of pipes) stored at contractors
(c) materials used at building sites
(d) pricing and calculations of cost statements
(e) overviews of incomplete order - e.g., delayed deliveries.

For further manual examinations of the above program various lists and statistics were made available by the EDP.

Advantages: Because of the warehouse storage program, an economic warehousing and buying policy could be established. The information stored in the EDP of the amounts in the warehouse permits a simpler overview of warehouse administration and supervision.

2,000 material positions. Warehouse value 22 million Schillings, approximately 100,000 annual material shifts.

Building Superintendents' Wages

Since 1966 the wages of the superintendents were computed by EDP. At first the BULL Gamma 10 was used; since November 1970 BULL GE 435 - and since the re-organisation started in the Fall of 1974 the IBM 370/155 is used. The present system encompasses the gross and net amounts, together with the payslips; giro and post lists; SV lists, and several deductions such as income tax, SV, employer's contributions, union dues, sundry statistics and a few auxiliary computations (lists of increases, deductions, etc.) It is possible to get an overview of the procedure for the current as well as for the past year. The annual statistics worked out include: annual adjustments; amount of deductions; income tax and annual wage balance.

The transition of these amounts into the bookkeeping operations is done impartially by means of a bookkeeping list, because this data then becomes part of the rental taxes.

The wages of 4,500 superintendents, who look after 8,000 units were calculated. 90,000 notices were put into punch cards over a year. The yearly turnover was 155 million Austrian Schillings; 129 million were superintendents' wages, and 26 million were employer supplements. (Values from 1972).

Superintendents' Wages M52

It became necessary to change from the BULL program because of its limited service abilities, and also because of the purchase of the IBM installation. The following changes of the existing program are planned -

(a) use of an optical record reader in order to reduce the work load of the data processing division

(b) storing the data in the data bank, in order to have more flexible processing

(c) dividing personnel data and income data for later integration into - on one hand, a personnel information system, and on the other hand into a building supervision and billing system.

This new program will enlarge the essential content of:-

(a) calculations over a two-year period

(b) executed calculations

(c) data information exchanges with the Central banks; unions; and later rental buildings and bookkeeping

(d) heating costs of the heating plants

(e) corrections of the deductions

(f) yearly income statistics upon retirement

Real Estate

In the reorganization of the real estate (land allotments) of the City of Vienna, there will be a change in the central land allotment inclusively to EDP. In anticipation of this all hand-entered mistakes and incorrect entries on records and maps must be removed. All changes shall then be collected in the central land allotment records, and will then be stored in the EDPA Terminals. This way, a short notice, at any time, an actual and complete record of each lot can be made available.

Real property of the City of Vienna (in Vienna) 194 km^2
Real property of the City of Vienna (outside Vienna City) 342 km^2
Total real property of the City of Vienna 536 km^2
Lots owned by the City of Vienna - approximately 60,000.

Tender Proofs; Tender Orders and Tender Comparisons

On the basis of data obtained by project order (FBØ) the necessary building performance (rate) can be defined by the appropriate department, and this data can be contained in the BOD. In conjunction with a standardized listing of building performance or on the basis of a free description of performance there will be a fully automatic print out which can be duplicated.

The tender submitted by the bidder (those figures proposed by the bidders) can be taken, and automatically assessed and proofed for mathematical correctness and a listing of the tenders can be arranged. As well, the bids will undergo a technical and economic comparison (single price units, building material as well as capital overview), and the lowest bidder's (knocked down by the appropriate department) performance record for later actual building costs will be stored.

Advantages: The storing of actual price-components taken from the many building companies and from the tender comparisions, will enable, with the aid of EDP, a very precise cost estimate of planned buildings. In the future, budgetary prognosis for a short term financial plan can be obtained.

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2 objectives, annual costs 1973 3Ø million Schillings

Housing Applications MA 50/Ref. V

All the applications for public housing at the municipal council office 50/Ref. V are electronically recorded and stored. On the basis of the actual parameters (preferred apartment location; place of employment; year of application; reservation status; family size), each month lists of potential residents are made available.

One can count on 800 applications each month; of these approximately 600 can obtain living quarters so that 200 applicants have to be turned down (1973 figures).

Periodically statistics are made available for the management (e.g., income groups; family sizes; in-and-out movement in specified new subdivisions).

Advantages: The computer permits a fast choice of those housing applicants who meet the required criteria.

80,000 stored housing applicants of which 20,000 have preference, and 60,000 are obvious rejects.

Building Incentives

Following the Building Incentives Law of 1967 private building activity in Vienna is promoted by especially cheap interest rates. All applications are electronically stored and through the Municipal Section 25 these applications are passed on to the Building Office. After a positive examination result the Building Office will pass on the loan permit to the provincial government and a positive assurance is given. With the aid of EDP all applications are tested; the testing area of MA 25 has been taken over; the application and proposed list is made available to the Building Office.

In the future the following will be done:

(a) the list will go to the provincial government as a basis for credit assurances

(b) promissory notes

(c) supplementary loans

Growth approximately 1,500 cases a year.

Housing Renovations

According to the Housing Renovations Law of 1969 especially low-interest rates for the improvement of old housing stock were made available. Since there is only a limited amount of credit available annually, the credit applications have to be especially carefully selected. The Building Office meets quarterly in order to evaluate the applications which are made available through the EDP.

If credit is approved by the Building Office, the applicant is sent by the appropriate special office the EDP printed information regarding which credit institutions and other offices he must contact.

Annual growth rate of owners about 2,000 cases.
Annual growth rate of renters about 2,000 cases.

Rental Directives

The rental directives contain the tabulation of rents and the debit to the renter. Each superintendent is furnished with a printed rental list, in which rents are listed. Step by step, rents are to be no longer paid in cash. To the bookkeeping operation are made available lists of collections bookkeeping controls. In case of a new rental, the lease, the method of payment and the rental card index is automatically made available. The data are stored, in order that apartment and movement statistics are possible. They are also used to obtain standardized values.

Data of about 180,000 old and new apartments
Gross rental income approximately 900 million Schillings.

Rental Calculations

In the definition of the project aims, it was taken into consideration that in a later phase of development, an automatic apartment administration, following from the system of calculations, would be built up.

Advantages: Information about all apartments' accounts; the area of living space, as well as the layout of all apartments will be recorded by EDP; as well as the running and continuing costs; the use (business) and the renters; integration with the already stored project's building costs; street names, and lot configurations.

Approximately 200,000 living units.

BOD Employees

The MD - BOD had as of 31.05.1974 166 employees. These are divided into the following:

Administrative and Staff Jobs (10 people)

- administrators
- chancery
- internal organization and schooling
- project planning
- project supervision
- economic considerations

Project teams (96 people; 18 of which are external co-workers, consultants).

These are concerned mainly with the organization of EDP, and the programing of new areas of interest; they also have to be concerned with and aware of the necessary program changes resulting from organizational or law changes.

At this time there exists project teams for the following areas of specialization:

- personnel
- income
- real estate and planning
- building department
- work shops
- basics (soft ware)
- programing pool.

Because of the many applications of the BOD, the employees of the various project teams are highly specialized, especially in reference to the existing facts as well as with a view towards the EDP - soft ware to be used.

Auxiliary Personnel (46 people)

These workers manage the three EDP units; a BULL Gamma 10; a BULL GE 435 and an IBM 370/155. This group is divided into the work preparators and the operators.

The work preparation consists of short term programs; also all programs for the EDP unit are prepared here; as well, the results are formally checked and sent to the appropriate departments. The operators control the use of the EDP units and the auxiliary machines.

Data Programers

These employees handle the punch and the proof machines; also the magnetic tape holders; the data information which goes into the data units (punchcards, magnetic tapes).

Because of the rapid growth of the BOD and because of lack of work space it became necessary to divide the places of operation into three difference offices. In the Rathaus (City Hall) Stiege 7, Paterre (Ground Floor) is found BOD Administration, the Data information and the BULL units. At Dr. Karl Lueger-Ring No. 10, the IBM units are housed as well as part of the project bureau.
At Rathausstrasse 8, the remainder of the project teams are housed.

This decentralization necessitates a heightened supervision of the projects; it makes more difficult the necessary communication between the various user groups of the BOD and causes considerable waste of time during the program test phase for the programers located in the Rathausstrasse.

Because of relatively heavy use of the offices in which the organizers and the programers are located, the necessary concentration is often interrupted.

There should be considerable increase in efficiency of the BOD personnel when the move to the, currently still in the planning stage, new central data clearing house (at the site of the former Forum Cinema) takes place.

Because of the installation of a decentralized terminal in the Rathausstrasse, the programers will have the possibility to complete part of their testwork, even with locational distance of the computer, directly in their offices.

EDP Units of the MD-BOD

Those EDP units of the BOD, because of their technical development, and because of their difference abilities, can offer even at the organizational side various services.

The EDP units, BULL Gamma 10, and GE 435, were installed in 1966, and were mainly programed using specific machine language. Missing is the directly approachable storage unit, and that is why specific datum could not be put to use.

These units are therefore only usable in repetitive programs of mass data, in which continuous ability to give information of a specific nature is not necessary.

Because of the use of specific computer programs (language) it became necessary to train specialized programers, whom it would be difficult to replace if they left BOD, especially because another strange programer would not be able to correct or analyze their programs.

In those units (IBM 370/155) installed in 1972, these faults are no longer present because of their wider application and larger, more modern frameworks.

The programs used for business-economic applications use Cobol computer language, and the technical-economic field uses FORTRAN. BOD also uses further aids in its programs in the form of precompilers for "normal programs" and "decision tables". The use of these aids, leads to good documentation and gives an easily understood programing basis for the programer.

The computer languages named above can be used today in all

therefore certain, that with the now available outlined programs, which are written in computer language, that these can be used without having to make too many adjustments.

Connected with the central unit are magnetic tape storage facilities with a total capacity of 1.6 billion Bytes. This enables the direct entry into the data. This opportunity is used, on one hand, to put through several independent programs (multi-programing) and, on the other hand, to answer those questions, which are directed through the terminals at the central data bank. The terminals are mainly used for billing calculations. The actual account deductions can be produced. The account deductions appear on a screen, but the terminal can also give a print out.

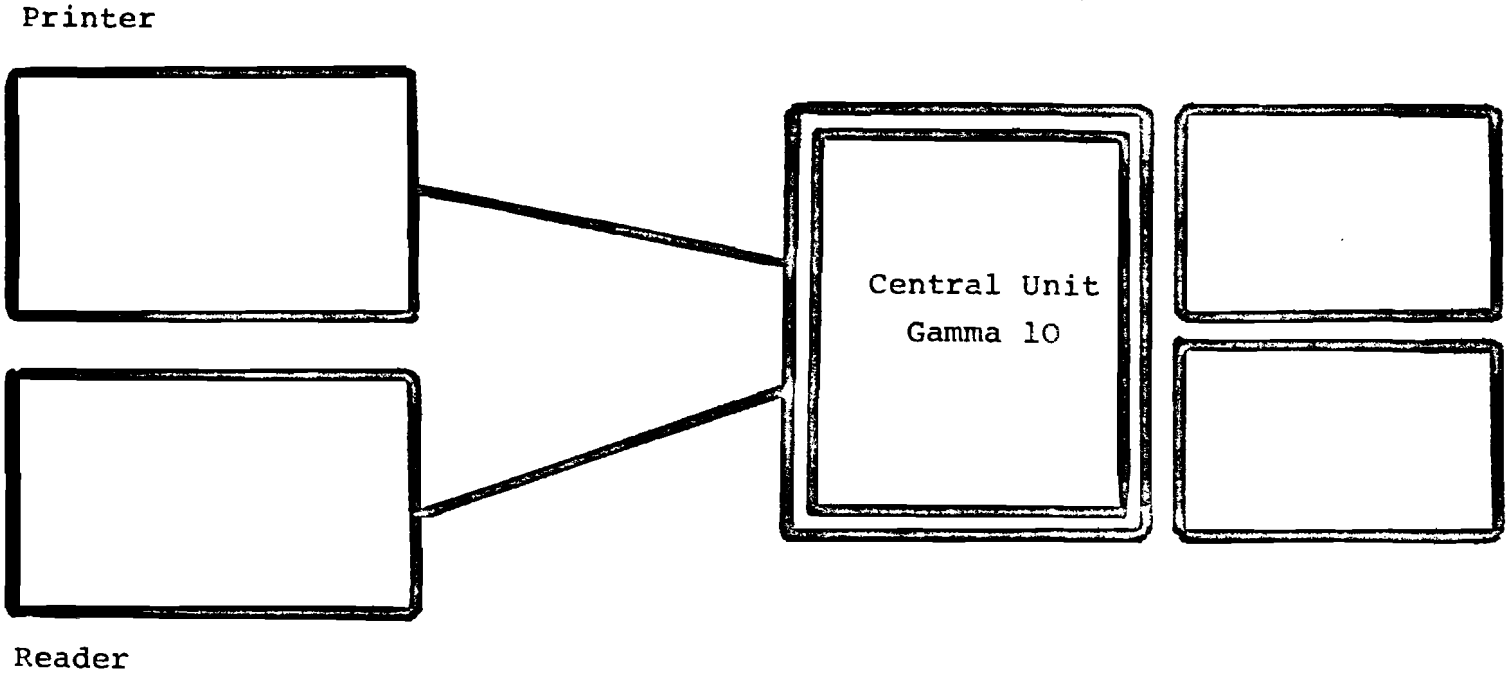
The terminals put to this use are located in the Rathaus, in the MA 6. Soon all city payment offices will be equipped with terminals.

Because of these terminals the entries made by hand or on index cards and account slips are no longer necessary. In the future it is hoped that there will be a much wider application of these data units.

On the following pages will be found a schematic drawing of the installation of the EDP units with the capacity of each unit included.

Illustration 1

MACHINE CONFIGURATION OF THE GAMMA 10 UNITS



Configuration of the Gamma 10 Unit

Central unit; Card read out and printer

Central unit, readout and printer work synchronized
Signs unit
One sign is composed of six (6) bits and a proof magnetic storage unit centre
4,096 signs storage capacity
Cycle time $7/^{u}$ seconds
Working speed 18,000 beats (impluses) per hour
(18,000 cards can be read or punched and/or 18,000 lines can be printed in one hour)

Reader Facit Per 1000

Punch line reader
6 track- punch band by Olivetti
Reading Speed 500-1000 figures per second

Illustration 2

MACHINE CONFIGERATION OF BULL GE 435