This selection of four brief papers published by the Environmental Simulation Laboratory, University of Michigan, lists the names, pertinent information and sources of some 50 gaming/simulations. Information on miscellaneous Environmental Simulation Laboratory publications, a history of the Laboratory, an appendix listing other games and sources, and a detailed description of the METRO-APEX game, including some suggested reference books for use during play of METRO-APEX, are also provided. (LK)
A SELECTED LIST
OF URBAN AND ENVIRONMENTAL GAMING/SIMULATIONS

Prepared July, 1972 at the: Environmental Simulation Laboratory
The University of Michigan
109 E. Madison
Ann Arbor, Michigan 48104
(313)-763-0258

We of course do not intend this list to be definitive, but do hope it will be
useful as a starting point for obtaining further information about specific
games. We have tried to omit gaming/simulations we do not consider useful
for some educational purpose, as well as those which do not focus on one or
another "social concern."

We often are asked which age group a particular game is best suited for. One
of the beauties of games is that they are, as the advertiser likes to say,
"suitable for all ages" — at least junior high and up. In fact, we find that
young people play more easily and more fully, willing to experiment and less
inhibited as they are.

Nevertheless, we have omitted from our list those designed principally for
use within the classroom situation (including a number of "history" games),
but have appended an (incomplete) list of sources of brochures on games spe-
cifically for elementary and high school people. The "Appendix" also contains
a very few other sources of game information.

*An asterisk before a game indicates that detailed information about it may be
obtained from the Environmental Simulation Laboratory. Please consult the
Publications List for cost, if any. Further information about other games
should be requested from the distributor and/or game developer.

ESL staff is prepared to run its gaming/simulations and some of the others
under certain circumstances for a negotiable fee.

Barbara Steinwachs
CONTENTS

I. Developed by Staff of Environmental Simulation Laboratory
II. Developed by Other University of Michigan Divisions
III. Distributed through Instructional Simulations, Inc.
IV. Distributed through Psychology Today
V. Developed by and/or Distributed through Urbandyne
VI. Developed by Western Behavioral Sciences Institute
VII. Distributed through Western Publishing Co., Inc.
VIII. Miscellaneous
IX. Computerized Gaming/Simulations

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They Shoot Marbles, Don't They?
Tracts
Urban Dynamics
WALRUS I
WARD
Youth Culture Game
A SELECTED LIST
OF URBAN AND ENVIRONMENTAL GAMING/SIMULATIONS

I. DEVELOPED BY STAFF OF ENVIRONMENTAL SIMULATION LABORATORY

*CLUG (Community Land Use Game)
urban and regional economics

Developed by: Allan G. Feldt
Players: about 15
Time: 6 hr. or, preferably, longer

Player's Manual ($4.95) with basic model, experiments (variations), and readings; and Instructor's Manual (gratis) with simple playing pieces publ. 1972 by:
The Free Press
Department F
Riverside, N. J. 08075

Complete kit ($75) available from:
Urbex Affiliates, Inc.
474 Thurston Road
Rochester, New York 14619

FORAM: See "ORAM," below.

*Housing Plan (also see Section IX)
low-and-moderate-income housing

Developed by: Larry C. Coppard & Mary K. Naulin
Players: 10-30
Time: 4 hr.

For further information about the game and/or a run of the game, contact:
Environmental Simulation Laboratory
University of Michigan
109 E. Madison
Ann Arbor, Michigan 48104

*M.E.T.R.O.-APEX: See Section IX.

*Metropolis: See Section IX.

ORAM
generalized framework describing basic structure of this family of games

Developed by: William Liggett & Allan Feldt
FORAM (Forest Optimal Resource Allocation Management)
use of national forest resources

Developed by: William Liggett and Robert Shackelford

Full instructions ($4.00 for each) available from:
Environmental Simulation Laboratory
University of Michigan
109 E. Madison
Ann Arbor, Michigan 48104
SLORAM (Shore Line Optimal Resource Allocation Management)  
use of shorelines (with high recreational value) in less populated areas  
Developed by: William Liggett and Peter Reiner  
Players: 7 (several games may be run simultaneously)  
Time: 2-3 hr.

*PPOM (Population Policies Orientation Model)  
state and national planning with respect to economic, demographic, social, and political development  
In process of development by: Allan G. Feldt  
Players: 15-30 optimum  
Time: 4-6 hr.

SLORAM: See "ORAM," above.

*W.A.L.R.U.S. I (Water and Land Resource Utilization Simulation)  
impact of public and private decisions on water pollution  
Developed by: Allan G. Feldt & David Moses  
Players: 15-30 optimum  
Time: 4 hr.

*WARD  
community development and housing improvement  
Developed by: Larry C. Coppard & Marilyn Miller  
Players: 10-50  
Time: several 3-hr. sessions

II. DEVELOPED BY OTHER UNIVERSITY OF MICHIGAN DIVISIONS

COMPACTS (Community Planning and Action Simulation)  
urban social service system  
Developed by: Armand Lauffer  
Players: 20-60  
Time: 3 hr.-3 days

Complete description ($3) from:  
Sea Grant Advisory Services  
1101 N. University Bldg.  
University of Michigan  
Ann Arbor, Michigan 48104

Complete kit available from:  
Robert Wesner  
c/o Random House  
201 E. 50 Street  
New York, New York 10022
Extinction
 evolution and survival or extinction
 of species

Developed by: Stephen F. Hubbell
Players: 3-4
Time: 3 hr. or more

*Policy Negotiations
 a priming game on allocation of influence
 in the decision-making process

N.B. Modification (to subject matter
 of interest to group playing)
 integral to game

Developed by: Fred Goodman
Players: 6-10 optimum (more possible)
Time: Priming Game: 2-3 hr.
Re-design Time: 1-many hr.
Re-play Time: 2-3 hr.

*SIMSOC (Simulated Society)
 the establishment and maintenance of
 social order

Developed by: William A. Gamson
Players: 20-50
Time: 6-8 1-hour sessions

*They Shoot Marbles, Don't They?
 societal analysis

Developed by: Fred Goodman & Bob Parnes
Players: 8-50 (15-25 optimum)
Time: 2 1/2 hr or more

---

III. DISTRIBUTED THROUGH INSTRUCTIONAL SIMULATIONS, INC.

Campaign
 state legislative race

Players: 23-40
Time: 10-12 hr.
F.L.I.P. (Family Life Income Patterns)  
family budgeting, investment, credit 
and interest in terms of changing family 
goals  
Players: up to 30  
Time: 2-8 hr.  

Impact  
community action in problem-solving 
situations  
Players: 20-35  
Time: 8-10 hr.  

Tracts  
Core city land use  
Players: 12-35  
Time: 2-4 hr.  

IV. DISTRIBUTED THROUGH PSYCHOLOGY TODAY  
Blacks and Whites  
racial conflict  
Players: 3-9  
Time: 1-2 hr.  

Cities Game  
urban tension and negotiation  
Players: 4-16  
Time: 1-2 hr.  

V. DEVELOPED BY AND/OR DISTRIBUTED THROUGH URBANDYNE  
Edge City College  
strategies and processes of a college or 
university  
Players: 15-36  
Time: 3-4 hr.  

SLUDGE  
environmental pollution  
Players: 15-25
Urban Dynamics
basic structures & interlocking systems in the growth and development of a metropolitan area
Players: 12-20
Time: 4 hr. or more

Youth Culture Game
"a total environment improvisational theater game"
Players: 20-80
Time: 2 hr.

VI. DEVELOPED BY WESTERN BEHAVIORAL SCIENCES INSTITUTE
Descriptive catalogues available on request from:
Simile II
P. O. Box 1023
La Jolla, California 92037

Crisis
international conflict
Players: 18-36
Time: 2-4 hr.

Metropolitics
varying types of metropolitan government
Players: 18-35

Napoli (NATIONAL POLITICS)
legislative process and representative nature of democracy
Players: 8-36
Time: 2-4 hr.

Plans
conflicting interest groups attempt to change American society
Players: 12-36
Time: 3-8 hr.

Sitte
conflicting interest groups work to change a city
Players: 10-30
Time: 2-4 hr.
Starpower
the uses of power

Developed by: R. Garry Shirts
Players: 12-24
Time 1-3 hr.

VII. DISTRIBUTED THROUGH WESTERN PUBLISHING CO., INC.

Democracy
representative government
(legislative process):
composite of 8 different games

Players: 6-11
Time: 1/2 - 4 hr.

Ghetto
problems of the urban poor

Developed by: Dove Toll
Players: 7-20
Time: 1 hr. or more

VIII. Miscellaneous

Consensus
presidential electoral strategy

Developed by: John Reed Koza
Players: 2-4
Time: 1 hr. 15 min.

Dirty Water
water pollution and ecological balance

Developed by: Judith Anderson, Helen Trilling, Roger Moody, Rich Rosen
Players: 2-4
Time: 1-2 hr.

Election
democratic process and presidential elective system
(1-9 games)

Developed by: Joseph Young
Players: 4
Time: 30-60 min.
Future
cross-impact of possible future developments

Developed by: Olaf Helmer, T. J. Gordon, Hans Goldschmidt
Players: 4-12
Time: 1 hr.

Lobbying Game
lobbying process in state legislature

Developed by: David Williams and Stanley Blostein
Players: 22-34
Time: 2 hr.

New Town
new community development

Developed by: Barry Ross Lawson
Players: 7-10
Time: 3-4 hr. or more

The Poverty Game
the dynamics of poverty in affluence

Developed by: Jim Egbert
Players: 10 or more
Time: less than 1 hr.

Square Mile
land development

Players: 2-4

IX. COMPUTERIZED GAMING/SIMULATIONS

City I
economic, political, and social interaction towards a developing city

Developed by: Peter House
Players: 25-100
Time: 1 day or more
Computer Needed: IBM 1130
(min. 8K core storage, single disk drive)

Kits are currently "out of print."
For information contact:
Olaf Helmer and Theodore Gordon
Institute for the Future
Middletown, Connecticut

Complete kit ($45) available from:
Games Group II
P. O. Box 2088
Brandeis University
Waltham, Massachusetts 02154

Kits at varying levels of complexity available from:
Harwell Associates, Inc.
Box 95
Convent Station, New Jersey 07961

For directions, contact:
Jim Egbert
Pilgrim United Church of Christ
4418 Bridgetown Road
Cincinnati, Ohio 45211

Complete kit available from:
Milton Bradley Co.
Springfield, Massachusetts

Although a workable game of substantial quality and character, City I is not available through any formal distribution mechanism. Universities known to be using the model in some form are, among others:
Howard University (Washington, D.C.)
University of Michigan (Ann Arbor)
*Housing Plan (See Section 1)  
Computer Needed: IBM 360

*M.E.T.R.O.-APEX  
physical and economic development of a metropolitan area, with emphasis on air pollution control  
Developed by: staff of Environmental Simulation Laboratory  
Players: 30-60 optimum, but fewer or more ok  
Time: several cycles of 4-5 hr. each  
Computer Needed: IBM 1130 (min. 8K core storage, single disk drive) or 360 (min. 360/40; 256K, but 128K is possible).

*Metropolis  
metropolitan growth and development, with emphasis on capital budgeting and public expenditure  
Developed by: Richard D. Duke  
Players: 9 is best for one game; 2 or 3 games ("cities") can be run simultaneously  
Time: several cycles of about 1 hour each  
Computer Needed: at present, IBM 1130 (min. 8K core storage, single disk drive)

River Basin Model  
an extension of City IV (see City I above), this version is based on a large city and its surrounding watershed  
Developed by: Peter House and Staff  
Players: 20-120  
Time: 1 day or, preferably, longer

Program unavailable at present time

Manuals, user forms, and computer program tentatively available from:  
Environmental Protection Agency  
Charles Pratt  
Office of Manpower Development  
Office of Air Programs - EPA  
P. O. Box 12005  
Research Triangle Park, North Carolina 27711  
(919) -549-8411

or from:  
Environmental Simulation Laboratory  
University of Michigan  
109 E. Madison  
Ann Arbor, Michigan 48104  
CONTACT EITHER SOURCE REGARDING PURCHASE COSTS.

Manual will be available by Fall 1972 from Environmental Simulation Laboratory. Computer program ($100; additional charge for one disk) available now from ESL.

For further information regarding the gaming/simulation or a run of it, contact:  
Environmental Protection Agency  
Environmental Studies Division  
Washington, D. C. 20460

or, preferably, one of the universities listed below.
One University in each of ten federal regional districts in the United States is disseminating information about the River Basin Model. They are:

John W. Sommer/Dept. of Geog./Dartmouth College/Hanover, N.H./(603)-646-3117

REGION II (N.Y., N.J., Virgin Islands, Puerto Rico):
Prof. Myron Uretsky/New York Univ./Graduate School of Business Administration/100 Trinity Place/New York, New York 10006/(212)-732-5820

REGION III (Pa., Md., Del., W. Va., Va.):
W. L. Garrison/Environmental Systems Engineering/School of Engineering/University of Pittsburgh/Pittsburgh, Pa. 15213/(412)-621-3500 x6338

REGION IV (Ky., Tenn., N. C., S.C., Ga., Ala., Miss., Fla.):
Michael D. Kennedy/College of Architecture/Pece Hall/University of Kentucky/Lexington, Ky. 40506/(606)-257-1881

REGION V (Ohio, Ind., Ill., Mich., Wisc., Minn.):
Allan G. Feldt/Environmental Simulation Lab./University of Michigan/109 E. Madison/Ann Arbor, Mich. 48104/(313)-763-0258

REGION VI (Ark., La., Tex., Okl., N. Mex.):
Luis H. Summers/University of Oklahoma/180 West Brooks St./Room 252/Norman, Okl. 73069/(405)-325-5761

REGION VII (Iowa, Mo. Kans., Nebr.):
Gerald L. Esterson/Dept. of Chemical Engineering/School of Engineering and Applied Science/Washington University/St. Louis, Mo. 63130/(314)-863-0100 X4017

REGION VIII (N. Dak., S. Dak., Mont., Wyo., Col., Utah):
Dr. Leon Osterweil/Dept. of Computer Science/University of Colorado/Boulder, Col. 80302/(303)-443-2211 X6902

REGION IX (Ariz., Nev., Ca., Hawaii, Guam):
Dr. Stephen F. McCormick/Institute for Educational Computing/Claremont Colleges/McConnell Center/Pitzer College/Claremont, Ca. 91711/(714)-626-8511 X3312
REGION X (Idaho, Wash., Oreg., Alaska):
Dr. Edgar M. Horwood/Departments of Urban Planning and Civil Engineering/Urban Transportation Program, FW-10/University of Washington/Seattle, Washington 98195/ (206)-543-7331
APPENDIX

I. The second (revised) edition of the annotated (and rather complete) Guide to Simulation Games for Education and Training (Zuckerman and Horn, ed.) may be obtained for $15 from Information Resources, Inc./P.O. Box 493/Lexington, Mass. 02173.

Werner and Werner's Bibliography of Simulations: Social Systems and Education (Western Behavioral Sciences Institute/1150 Silverado/La Jolla, Ca.) is a very complete book and periodical listing, but through Jan. 1969 only. 178 pp. $4.00.

II. Some Sources of Games for Elementary and High School Use

A. From those already listed

Educational Games Co. (Section VIII)
Jim Egbert (Section VIII)
Harwell Associates, Inc. (Section VIII)
Instructional Simulations, Inc. (Section III)
Simile II (Section VI)
Urban Systems, Inc. (Section VIII)
Urbandyne (Section V)
Western Publishing Co., Inc. (Section VIII)

B. A few others

ABT Associates, or Games Central/55 Wheeler St./Cambridge, Mass. 02138
Environmental Design/P.O. Box 683/Chatsworth, Ca. 91311
Interact/P.O. Box 262/Lakeside, Ca. 92040
The Macmillan Co. - School Division Dept. SNY/Riverside, N.J. 08075
Science Research Associates, Inc./259 East Erie St./Chicago, Ill. 60611

III. A wide variety of games for specific (and sometimes limited) purposes has been designed by ABT Associates, Inc. Some are available for public use, some not. Information may be obtained from:

Games Central/55 Wheeler St./Cambridge, Mass. 02138
**PUBLICATIONS AND GAME DESCRIPTION LIST**

The following may be obtained at the prices listed from:

Service Division  
Environmental Simulation Laboratory  
University of Michigan  
109 E. Madison  
Ann Arbor, Michigan 48104  
(313)-763-0258

Prices already include postage and handling.

I. INFORMATION ON SPECIFIC GAMING/SIMULATIONS

Please note that the shorter game descriptions offer an introductory idea of what the gaming/simulation is about and how it is played, but not in-depth information.

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II. MISCELLANEOUS ENVIRONMENTAL SIMULATION LABORATORY PUBLICATIONS


An early conceptual design for the complex gaming-simulation M.E.T.R.O., including some of the basic logic of the selection of roles and models to be incorporated into an early version of the computer-based urban game.

A discussion of the context and rationale for development of the computer-based gaming-simulation M.E.T.R.O. and a description of some of the assumptions and components of the game. The paper also describes the uses to which the builders of M.E.T.R.O. intended the game to be put and discusses research for which the game may be used.


Published in American Behavioral Scientist, August 1968, pp. 16-19.


An annotated bibliography.

Environmental Simulation Laboratory, "Final Report to the Ford Foundation on a Grant for Computer Equipment for Urban Research and Training," 1970, 46 pages. $2.00

The Environmental Simulation Laboratory first came into being in 1964 in the form of the METRO project. This project, funded by the Housing and Home Finance Agency (now Housing and Urban Development) of the U.S. Government was a joint effort of Michigan State University and the University of Michigan. Cooperating authorities at Michigan State University were the Institute for Community Development and the Department of Urban Planning and Landscape Architecture. The project was physically located at the offices of the Tri-county Regional Planning Commission in Lansing. In 1965 the project was supplemented by a grant from the Ford Foundation which was designed to assist in the development of computer techniques and urban studies.

In late 1967 the project and the staff previously identified as the Urban Regional Research Institute at Michigan State University transferred to the University of Michigan where a new unit, The Environmental Simulation Laboratory, was formed within the School of Natural Resources.

After arrival at the University of Michigan several new projects were undertaken most notable of which were those dealing with the Susquehanna River Basin for the State of New York and the U.S. Corps of Engineers, and the APEX project for the United States Office of Air Pollution as a subcontract to the University of Southern California. This project went through four contract periods, finally terminating in August of 1971. The product of this effort, M.E.T.R.O.-APEX, a complex gaming-simulation of an urban region with an emphasis on air pollution, is now being used across the nation by over 50 American universities and is currently in use in more than a dozen foreign countries where it has been translated into two languages.

Projects currently under design or development in the Laboratory include a forest simulation, a river basin simulation, a game simulation of the Monterey Bay region of California, a gaming-simulation of the Grand Traverse Bay area of Michigan under the Sea Grant program, a housing simulation for Germany in the City of Dortmund, a policy simulation related to low- and moderate-income housing in suburban areas, a community development game to be used by inner city residents, and a program in the development of gaming simulations for high management use by the French government. In addition, we have recently initiated a two-year program of funding from the Ford Foundation to develop and disseminate games for citizen use in urban communities. A small grant from the General Electric Foundation is used to support students in the development of games related to environmental issues. Under a grant from the National Institute of Mental Health, currently in its third year, the Laboratory provides special assistance in game design and use to faculty, students, and community groups. Because of a network of over twenty-five related staff people, the Environmental Simulation Laboratory is involved in a broad range of research on the development of new gaming simulation models in addition to applications to problem solving and educational applications.
The Laboratory is maintained by a series of research grants and is therefore dependent on these grants for its existence. In a recent reevaluation of its mission, the Laboratory staff confirmed its intention to mobilize effort toward the development of a sophisticated and effective gaming-simulation process to be used in the development of public policy in some political jurisdiction in the country. It is believed that this mission if fulfilled will demonstrate the viability of the concept of gaming-simulation which we believe to be potentially useful in management situations typified by variables which are diffuse, intangible, rapidly changing, and heavily dependent upon citizen input. In such a situation gaming-simulation is a uniquely useful planning methodology. Most of the projects currently being conducted are directed toward this mission.
MEMORANDUM: September, 1971

FROM: Mr. Larry Coppard, Coordinator, Service Division

SUBJECT: METRO-APEX INFORMATION

Cost

1. METRO-APEX Manuals and Forms
   complete set of 100 manuals and game users forms: 200.00

2. Computer Program
   2 disks IBM-1130-2B system 180.00
   1 tape IBM 360 system 15.00
   service charge for loading disks or tape 100.00

3. User forms kits (includes enough consumable game materials for 50 players) 40.00

4. Game Director's Training
   @ $50.00 per day--normal time required is 5 days 250.00

5. Demonstration Run
   A typical run requires:
   A. 3 days
   B. 25-60 players
   C. 5 ESL staff
   D. 8-12 hours of computer time and supplies
   E. consumable game materials
   F. suitable playing space
   G. use of manuals and reference materials
   ESL's fee for this type of run at the Lab's facilities in Ann Arbor, Michigan 2000.00

6. Out of Town Demonstration Runs
   price established in consultation with user

7. Consultation--perhour 20.00

Note: Special circumstances will vary these prices. ESL wishes to encourage METRO-APEX use in all ways possible, but is required to recover any associated costs. Where possible every effort will be made to provide service to a user within his budget limitations. If you have special concerns with regard to cost contact Mr. Coppard.
September, 1971
Page 2

Applications

The METRO-APEX program has been used by several major universities across the nation including Harvard, Yale, University of California, University of Michigan and the University of Southern California. It has been demonstrated for three Air Pollution Consortiums where over 15 other universities have participated. It is currently being used for advanced training by the Air Pollution Control Institute of the University of Southern California, the Law School at Harvard in urban land use control, for urban planning and resource management at the University of Michigan, as an interdisciplinary training program in law, planning, and engineering at the University of Southern California. The program is ideally suited for groups wishing to study urban phenomena, its problems and possible solutions. METRO-APEX has been translated into French and German and is in use in several places in Europe.

Game Time Frame

The METRO-APEX game should be played for a minimum of five cycles in order for it to be a meaningful learning experience. Each cycle usually takes from 3 to 4 hours and may take up to 8 hours. There are several options for playing the game including a condensed time span, i.e., two cycles per day over two and a half days; one cycle per day; or one day a week.

Computers

METRO-APEX is programmed in Fortran IV and runs on an IBM 1130-2B Computing System. This disk may be used with 8K working storage and larger units. A model 6 card Reader-Punch is the primary input device. Output may be either an 1132 or 1403 Printer. It will normally require 1 to 1 1/2 hours of processing time on the 1130 computing system, plus an additional 1/2 hour to 1 hour for keypunching the decisions onto computer cards, or 1 1/2 to 2 1/2 hours total. (Computing time varies depending upon the speed of the printer used.) IBM 360 capabilities are also available for IBM 36050 or larger systems.

Game Director's Training Course

This course will be offered periodically at the Environmental Simulation Laboratory. The course will be limited to 12 students. Each student will receive instructions in game operations, computer processing, and problem analysis. Training sessions may be held at other universities by special arrangement.

Staff

Staff requirements will vary with group size; however, a core of well trained staff members is essential. One well trained game operator with several knowledgeable role instructors (students who have previously participated in the game may serve as a role instructors reservoir) is usually sufficient. The following rules of thumb may be applied--3 staff for less than 20 players,
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5 staff for 20 to 50 players and 7 staff for 50 to 100 players. Needless to say, the better the staff the more satisfactory the learning experience becomes. Approximately 50 players is an optimal size group.

Consumable Supplies

Consumable supplies may be obtained at minimal cost from ESL. These supplies include student worksheets used to record player's decisions, work-maps, and coding sheets.

Replacement Manuals

Student Manuals do wear out and must be replaced. ESL has replacement manuals available for users at reasonable cost.

Game Room Space Requirements

A game room of approximately 20 square feet per player is needed. The room should have at least 5 sets of tables (one for each role) of sufficient size to accommodate the computer printout and other work materials. It is preferable to keep the students together in one room during the period of play. However, other facilities such as closed circuit television, moot court rooms, etc., can be used for supplemental training.

Demonstrations

The METRO-APEX game is available for demonstration runs. These are usually run over a 2 1/2-3 day intensive session. ESL will supply staff, manuals, supplies and a computer operator. The host institution should supply computer time, keypunch, computer supplies, meeting rooms, travel expenses, and students.

Special Assistance During Play

ESL will supply technical assistance to operating users at $20.00 per hour plus travel.

Update

Revised versions of the game are released periodically. Please drop a note if you would like to be informed about future releases.

LC/drm
Developed by the Environmental Simulation Laboratory

The most complex game of the M.E.T.R.O. series to date, M.E.T.R.O.-APEX focuses on the interplay of private and public-sector budgeting decisions with exogenously-induced economic fluctuations, and the consequences of this interplay on the physical and economic development of the metropolitan area. A participant in the game assumes one of five basic roles, public sector roles being those of Politician, Planner, Air Pollution Control Officer, with Land Developers and Industrialists representing the private sector.

The Politician role is that of an elected representative of a particular constituency within his jurisdiction. Provision is made for up to 8 Politician roles, with players forming both a city council and county board of supervisors. With the exception of votes on public policy issues, which are made separately by each Politician, all decisions of the "County Board" or "City Council" must be made jointly. Since each Politician represents a specific electoral district, the constituency of which may have different socio-economic characteristics, bargaining may be called for between Politicians in order to reach joint decisions. Each Politician must stand for re-election from his district every two years.

The decisions of the County Board and City Council focus on the budget as a major tool for defining and implementing policy. Both the raising of revenues for annual operating expenses of government and the expenditures of funds across a range of government activities are major concerns. In addition to the operating budget, which may include special programs which cross normal agency lines, Politicians are concerned with the provision of miscellaneous public buildings, and with financing these projects, often through the issuance of general obligation and revenue bonds. Information from the simulated environment regarding population shifts, the condition of public capital facilities, and the percentage of the population which is poor or unemployed, is made available in the computer output given to the Planner each cycle and may guide the Politician's decisions.

The Planner's role focuses primarily on the formulation of a capital improvement program and on recommendations for special programs for the Politicians' consideration in the following cycle, or year, when drawing up their budgets. The Planner also advises the Politicians on land use decisions such as the attraction of a new industry to town and rezoning applications submitted by the Developers. The Planner may recommend rezoning on his own initiative, if he desires, to further his planning goals, but must convince the Politicians to grant the rezoning. Since the Planner has no power to make binding decisions, his success depends heavily on his persuasive abilities. Two Planner roles are provided in the game, the City Planner performing these functions for the Central City and a County Planner for the rest of the area included in the game.

The Air Pollution Control Officer (APCO) is responsible for overseeing the air quality of the area represented in the game. He will be seeking funds, both County and Federal, to inspect industrial plants, measure emissions from these plants, and establish and operate air quality monitoring stations in various parts of the metropolitan area. He reports to the County Politicians and must receive from them the legislative authority for setting and enforcing air pollution emission standards.
There may be up to seven Developers in the game, each operating identically, although their initial property holdings and financial assets are different. Developers are concerned with buying, developing and selling real property. In order to make their decisions sensibly, they will have to estimate demand for particular types of developed property and projected profit-margins for each. Developers may deal in several density-price classes of single- and multiple-family residential land uses, local and regional shopping facilities and local (light) industry.

Like the Developers', the Industrialists' roles are very similar to one another, although the differences in their industrial operations allow some variation in the specific components of their roles. Five industries are currently operable in the game. In seeking profits from their operations, the Industrialists may set their production levels, their estimated sales and, with the exception of the publicly-regulated power plant, their sales prices. Sales will depend upon the competitiveness of the asking price, as determined by a simulated market. Since industry is a major contributor to air pollution, the Industrialist may at some point also have to invest in pollution control equipment or change fuel to meet legal emission standards enforced by the APCO.

M.E.T.R.O.-APEX, then, contains a total of 23 distinct roles: 1) Politicians -- 3 Central City, 5 County; 2) Planners -- 1 Central City, 1 County; 3) APCO; 7 Developers; 5 Industrialists. Fewer people can be accommodated by reducing the number of players in multiple-player roles (Politicians) and the number of Developers and/or Industrialists. Additional players can be added to the latter two roles and to the Planner and APCO roles to accommodate larger numbers of players. Additional roles, not as structured as those previously identified, may also be added to accommodate larger numbers of players or to help illustrate particular community needs or functions. Such ad hoc roles include those of Newspaperman, Regional Planners, and City and County Finance Officers. Approximately 4 - 5 hours should be reserved for each cycle of play.
SOME SUGGESTED REFERENCE BOOKS FOR USE
DURING PLAY OF M.E.T.R.O.-APEX

Includes 1963 data on population, employment, industries, earning levels, labor organizations, labor relations, freight transportation, passenger transportation, utilities, local services, taxes, and site data.


"A description of the Federal government's domestic programs to assist the American people in furthering their social and economic progress. Explains nature and purpose of programs, specifies major eligibility requirements, tells where to apply, lists printed materials available."

Concerned with the cause, effect, transport, measurement, and control of air pollution.
Volume I: Air Pollution, Air Pollution Meteorology, Effects of Air Pollution.
Volume II: Analysis of Pollutants, Air Quality and Meteorological Monitoring, Source Measurement and Community Survey.
Volume III: Sources of Air Pollution, Control Methods and Equipment, Air Pollution Control.


Requirements of the Air Quality Act of 1967, recommendations for prompt and effective implementation, and federal assistance guide.


General characteristics, living conditions, local government, finance, utilities, industrial resources, communication and transportation, bibliography.