A COMPUTER ORIENTED POLICE PLANNING SYSTEM

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A computerized long-range planning technique currently being used by the staff planning division of the Kansas City, Missouri, Police Department is described. Examples of recent applications are provided and results of the use of the system are shown.

The system, among other things, provides the planner with an overview model which characterizes the department in regard to organizational structure, personnel and equipment requirements, budgetary needs, population and areas served, crime statistics, and any number of other items relevant to departmental needs. The system is designed for use by police planners and requires little or no technical knowledge of computer operations. No programming experience is necessary. The system is generalized and can be applied to planning problems of any police department. The interactions of several hundred planning factors over a 10 period planning horizon which can be years, months, weeks, days, or any other desired increment, is depicted.

Capabilities and limitations of the system are described including the variety of computer installations which can accommodate the planning system. Projected applications of the system are described, in addition to planned improvements for the future.

PROBLEM SITUATIONS CONFRONTING POLICE PLANNERS

Planning is a decision-making process. It is a means whereby an organization or institution can meet expected change, produce desired change, and prevent undesired change. The need for planning, then, is due to the changing environment, the complexity of operations, the ever-increasing requirements for funds, the increasing number and complexity of regulations, and the inadequacy of the old informal planning methods. Computerized planning systems increase an organization's capability to take an "in-depth view" of the problems in the future; an organization may thereby develop effective courses of action to meet short-range, intermediate, and long-range goals and needs.

Quite often, however, planning attempts produce negative responses in those who should be involved. Some common responses from those who are approached about planning include: "We've survived without planning this long; who needs it?", "It's too blue sky, "It's just another job and I don't have the time," "It won't change anything," "It's inflexible," and "I know we're not doing as well as we can now, but if only they would . . ." To counteract criticisms and to provide a strong basis for planning, every effective plan must incorporate several elementary principles. First, the planning process must be simple enough to be understood by all those who should be involved with it. Second, the plan must be selective in placing proper emphasis on various elements, and it must be adaptable and flexible enough to accommodate change. Thirdly, the final benefit to be derived must be viable and worthwhile to all who are working with the plan. Finally, the planning process must not involve complicated, tedious paperwork to convert the desired goals into meaningful programs.

To assist in the development of a computerized planning system for police organizations, a program known as the "Computer Oriented Police Planning System" was developed by MRI and given the acronym of COPPS. This system involves the construction of computer simulation models which depict the functional and organizational aspects of the typical police department.

COPPS, as a computerized simulation system, represents a powerful and useful tool to address the characteristic "what if . . ." kinds of questions that frequently arises in formal police planning.

THE COPPS SYSTEM

To better understand the COPPS system several points of comparison should be made between it and the traditional Management Information System (MIS). First of all, COPPS does represent a management information system in the most fundamental sense; it provides police planners and administrators with timely information addressing an infinite variety of subject areas. To date, COPPS models have been structured focusing on such diversified law enforcement needs as:

- Budget Forecasting
- Retirement Benefit Studies
- Building Program Requirements
- Patrol Car Allocations
- Phase II Wage and Price Freeze Implications

A description of the budget forecasting model is presented later in this paper. The types of models developed are mentioned at this point to emphasize that COPPS is a planning *system* (as contrasted with a single model) which may be tailored to simulate any planning function in the department. The only requirement for the development of a COPPS model is the determination of relevant planning factors addressing the problem at hand and a definition of their functional relationship.

Typically, a COPPS model is developed around some pressing need facing the department. To use an example of a recently developed model, the impact of adding 50 additional patrolmen to the force was examined. The approach used here (as in the development of the typical COPPS model) was to identify first the planning factors to be addressed. In this case the most relevant factors include:

Personnel Requirements

- Number of additional sworn personnel in the detective and sergeants' ranks required to maintain force balance.
- Number of additional clerk-typists required for supportive function.

Equipment Requirements

- Number of patrol cars required on the force after addition of the 50 patrolmen (including fixed trade-in policy; cars demolished in accidents, etc.).

The next stage in the development of the COPPS model is to define the relationship between the planning factors. In the case of personnel requirements it was decided that five additional detectives and six sergeants should be added for each 30 patrolmen in order to keep line functions in balance. Further it was determined that due to the anticipated field assignments of the new patrolmen, one clerk-typist for each five patrolmen would be needed for support work (primarily typing and filing of report forms). The primary equipment needed to support the expanded force size is an increase in the fleet of patrol cars. The relationship developed here considered a three beat scheduling of the patrol division, a one-man per car staffing policy, and normal down time of a vehicle for routine maintenance. The ratio incorporated in the model assumed that one new patrol car would be added for every five new patrolmen. A similar relationship was developed for other support items of equipment such as weapons, radios, uniforms, etc., although these are not detailed here.

The final phase in the development of a COPPS model is to determine what information output is desired. In the example, it was decided that the following information was of primary importance for planning purposes:

Number of

- Detectives
- Sergeants
- Clerk-Typists

required over the planning horizon.

Number of

- Patrol cars

required on an annual basis.

Total Fiscal Requirements

– (Since the increase in total fiscal requirements includes more than the salaries paid to the new patrolmen, a comprehensive accounting of all associated costs are required. Items to be included: new patrolmen's, sergeants', and detectives' salaries and fringe benefit costs; salaries of new civilians [clerk-typists] to be hired, costs of new equipment purchases [patrol cars, radios, uniforms, etc.])

The details of the English-like instructional language used to formulate the model are given in the next section. The above example is included here to illustrate the planning processes as it relates to development of a COPPS model. The basic steps used in the process are reviewed in Figure 1.

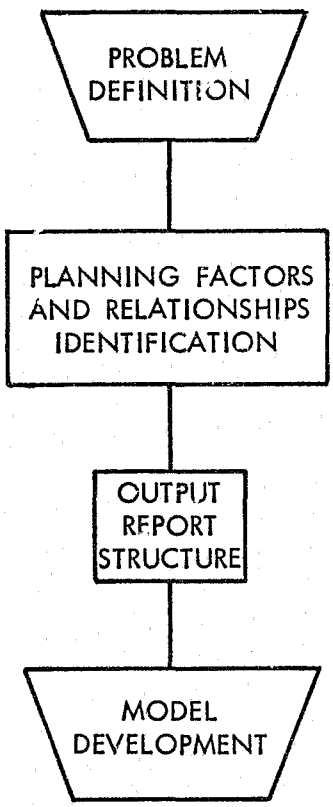


Figure 1 – The Planning Process in the Typical COPPS Model Development

HOW DOES COPPS WORK?

As noted above, in using COPPS the police planner selects the problem area to be addressed, identifies the relevant planning factors and their relationships and then proceeds to structure a model using an English-like computer language. Literally hundreds of interrelated planning factors can be considered in a single model. The computer does the tedious calculations thereby freeing the planner from the burden of repetitive calculations (and likelihood of errors) and enables him to explore many more alternatives, and to examine each alternative in greater depth. COPPS, then, in contrast to the conventional MIS, is very much a user-oriented system requiring no interface with technicians or computer specialists.

WHAT IS THE END PRODUCT OF A COPPS MODEL?

The output of a COPPS model provides a spectrum of practical, pragmatic, and useful information for police planners. The long range implications of current trends may be seen at a glance; many "alternative futures" may be examined; areas in need of additional research are clearly identified in structuring the model. Summary reports give answers to the questions posed by the planner. Documentation of the interrelationships of the planning factors and calculations performed are intrinsically provided.

BASIS OF THE COPPS SYSTEM

The knowledge and skills required to design and manipulate organizational models using the COPPS modeling language are extremely simple and straightforward to acquire.

Sample exercises are used to demonstrate the techniques used in structuring the model, the instructions to project planning item values, and the specification for reports.

The illustration shown in Figure 2 of the COPPS input format and instructions in the language shown below represent all of the technical skills required to structure a COPPS model.

The basic instructions used in developing a COPPS model include:

- Plan identification input
- Change by a percentage
- Change by an increment
- Achieve a goal
- Insert known planning item values
- Project and fill
- Summation of other planning items
- Formula/(Function) of other planning item
- Function of a previous period
- Minimum (Maximum) of other planning items
- Accumulation of a planning item
- Heading or section title
- Summary report

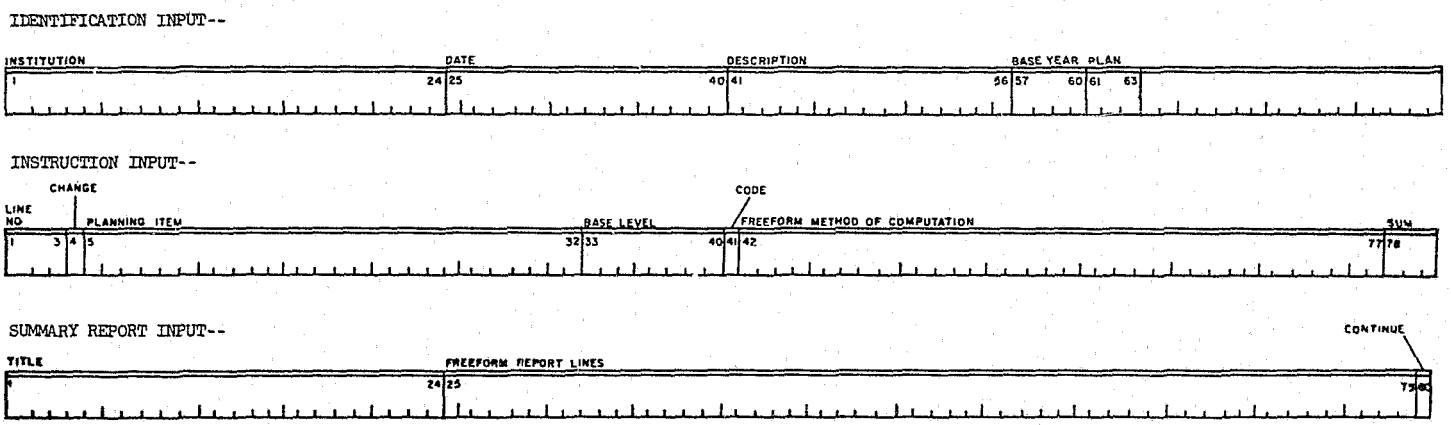


Figure 2--COPPS Language Input Formats

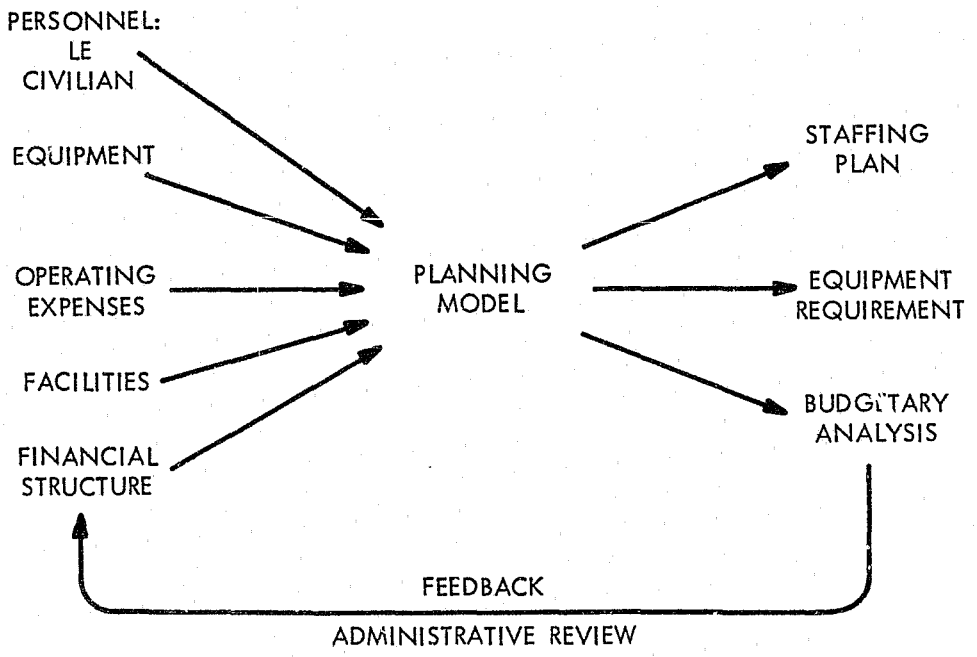


Figure 3--Police Planning Model

An understanding of these 13 basic instructions will enable the police planner to develop COPPS models to address a multitude of planning areas.

EXAMPLES OF MODELS DEVELOPED

Budget Overview

The following example of a COPPS model depicts ten year budget projections based on prescribed variations of over 200 planning items coupled with complex interrelationships between the items. The basic structure of the Overview Model is shown in Figure 3. As shown in the diagram the principal planning items incorporated into the model include personnel, equipment, operating expenses, facilities requirements and a financial structure. The model in turn takes the input data and develops a personnel staffing plan, equipment requirements list, and a detailed budgetary analysis according to the predefined relationships of the planning factors. The feedback from the model output back to the input parameters depicts the interaction of police administrators and planners in analyzing output from the model and in generating alternate plans. The planning items which comprise this model are listed in Figure 4. The following pages show reports which were produced from the model. Additional reports can be obtained after the model is structured by the addition of a single card.

It should be noted that this is only one *example* of the unlimited model variations possible with the COPPS system.

FIGURE 4 – BUDGET OVERVIEW MODEL PLANNING FACTORS

KANSAS CITY POLICE DEPT.
BUDGET OVERVIEW
APRIL 16, 1971

1 Patrolmen
2 Detective
3 Sergeant
4 Captain
5 Major
6 Major of Detectives
7 Lt Colonel
8 Senior Analyst Technician
9 Systems Analyst Technician
10 Program Research Technician
11 Program Technician I
12 Program Technician II
13 Helicopter Pilot Technician
14 Firearms–Evid Supv Tech
15 Public Info Supv Tech
16 Total LE Personnel
17 Total–Ptrl, Det, Sgt
18 Civilian Support Requirement
19 Chief of Police
20 Mean Detective Salary
21 Mean Sergeant Salary
22 Mean Captain Salary
23 Mean Major Salary
24 Mean Maj Det Salary
25 Mean Lt Col Salary
26 Sr Anal Tech Salary (Mean)
27 Sys Anal Tech Salary (Mean)
28 Prog Res Tech Salary (Mean)
29 Prog Tech I Salary (Mean)
30 (Prog Tech II Salary (Mean)
31 Hlcpt Pilot Tech Salary–Mean
32 Firearms–Evid Supv Salary
33 Public Info Supv Tech–Salary
34 Civ Salary Clerk-Typist
35 Patrolmen Salaries
36 Detective Salaries
37 Sergeant Salaries
38 Captain Salaries
39 Major Salaries
40 Major of Det Salaries
41 Lt Colonel Salaries
42 Sr Anal Tech Salary
43 Sys Anal Tech Salary
44 Prog Res Tech Salary
45 Prog Tech I Salary
46 Prog Tech II Salary
47 Hlcpt Pilot Tech Salary
48 Firearms–Evid Supv Salary
49 Public Info Supv Salary
50 Civilian Supp Salary
51 Shift of Detectives
52 Sum, Ptr, Sgt, Det Salaries
53 Total LE Salaries
54 Total Civ Salaries (Ft)
55 Total LE + Civ Salaries (Ft)
56 Total LE + Civ Personnel (Ft)
57 New Recruits Per Year
58 Personal Services Total
59 A-1 Salaries
60 A-4 Extra Compensation
61 A-9 Unclassified
62 Contractual Services Total
63 B1.1 Auditing + Accounting
64 B1.7 Medical Exp-Non Inj
65 B1.8 Veterinary Expenses
66 B1.10 Professional Services
67 B1.11 Educational Expense
68 B1.13 Medical Exp-Inj
69 B2.2 Local Transportation
70 B2.3 Postage
71 B2.4 Drayage, Frgt, Express
72 B2.6 Travel Expense
73 B3.1 Advertising
74 B3.4 Printing-Duplicating
75 B3.6 Promotional Expense
76 B4.1 Fire E/C Insurance
77 B4.2 Liability + Prop Ins
78 B4.5 Notary Bond
79 B4.8 Hospitalization Ins
80 B5.1 Gas
81 B5.2 Electricity
82 B5.3 Steam
83 B5.4 Telegraph
84 B5.5 Telephone
85 B5.5 Time Clocks
86 B5.5 Water
87 B6.1 Bldg-Structural Repair
88 B6.3 Repair Plant Equip.
89 B6.5 Repair Oper Equip
90 B6.6 Repair Office Equip
91 B7.1 Rent of Land
92 B7.2 Rent of Building
93 B7.4 Rent of Machinery
94 B7.5 Rent of Office Equip
97 Work Line
99 B8.6 Investigation Expense
101 B9.1 Cleaning + Printing
102 B9.2 Disinfect + Exterminate
103 B9.3 Dues + Memberships
104 B9.5 Laundry + Sanitation
105 B9.10 Contract Work
106 B9.12 Tow-In Charges
107 Commodities Total
108 C1.1 Office Supplies
110 C1.2 Magazines + Periodical
111 C2.3 Chemicals
112 C2.4 Cleaning + Sanitation
113 C2.6 Feed
114 C2.7 Food
115 C2.8 Fuel Oil
116 C2.9 Institutional Supplies
117 C2.10 Licenses + Badges
118 C2.12 Lumber + Materials
119 C2.13 Drugs + Medicines
120 C2.14 Minor Equipment
121 C2.15 Motor Vehicle Gas-Oil
123 C2.16 Motor Vehicle Parts
125 C2.17 Paint + Supplies
126 C2.21 Wearing Apparel
128 Wearing Apparel-Recruits
129 Wearing Apparel-Existing LE
130 Total LE Personnel (Shift)
132 C2.23 First Aid Supplies
133 C2.26 Reserve Equipment
134 Capital Outlay Total
135 E3.7 Motor Vehicles
137 Inflate Vehicle Cost
138 E3.8 Office Equipment
139 E3.9 Plant Equipment
140 E3.11 Communications
141 Calculate CST Port Radios
142 Required Radio Chargers CST
143 E3.16 Other Equipment
145 Police Service Allocation
146 LE Retirement
147 Civilian Retirement
148 Civilian F.I.C.A.
149 Total Fiscal Requirements
150 Patrol Car Requirement
151 Shift No. Patrolmen
152 Total Required Marked Cars
153 Total Unmarked Cars
154 Inflate Marked Car Costs
155 Inflate Unmarked Car Costs
156 Costs-Marked Car Replacement
157 Shift Line 16
158 Net Inc Total LE
159 Inc Civilians Ea Year
160 Cum Civilians
163 Mean Capt Salary Per Period
165 Shift Line 18
169 Total,Capt,Det,Sgts
170 Total Sgts and Higher
171 Net New Detectives
172 Inflate Drugs + Medicines
174 Stub Nose Revolver Cost
175 Shift Number Marked Cars
176 No. Unmarked Replacements
177 Costs-Unmarked Replacements
178 Shift Patrol Car
179 New Cars Required-Additions
180 Costs-Additional Cars
183 New Detectives Work Line 1
184 Accum Sum L183
185 Tot Det Work Line 2
186 New Sgts Work Line 1
187 Cum Sum L186
188 Tot Sgts Work Line 2
189 Communications Work Line
190 Total Fiscal Req
191 Police Service
192 Budget Capsule
193 Personal Services
194 Staffing Model
195 Fringe Benefits
196 Personal Services
197 Contractual Services
198 Commodities
199 Capital Outlay
200 A-1 Salaries
204 Mean Salary - Patrol
205 Police Officers per 1000 Pop
207 KC Mo Population Projection
208 KC Pop (Thou)
209 Recruits Revolver
210 Board Members
211 School Guards
212 Hrly Employees
213 Board Members Salary
214 School Guard Salary
215 Hrly Employees Salary
216 Total Salary Board Members
217 Total Salary School Guards
218 Total Salary Hrly Employees
219 Number Clerk Typists
220 Number Other Civilians
221 Total Civ Hrly-Pt-Time
222 New Cars Req-Wrecks
223 Replacement Costs-Wrecks
224 Total Replacement Costs-Wrks
225 Tot All Remaining Cars
226 Additional Patrolmen
227 Add Percent Salary Increase
228 Patrolmen Base Number
229 Cum Ptrl Added
230 Total Patrolmen
231 Pct Increase Ptrl
232 Accum Pct Inc
233 Pct Mean Salary Increase
234 Cum Add Percent Increase
235 Cum Pct Mean Salary Increase
236 Net Pct Salary Increase
259 Tot Clerk-Typist Salary
264 Mean Other Civ Sal
265 Total Other Civilian Salary
269 Total Salary Chief of Police
270 Cum Sum of New Recruits
272 Tot LE Salaries
273 Net Inc Patrolmen
274 Sum Net Inc Ptrl
275 Cum New Cars Needed
290 New Recruits Work Line
297 (Dollars in Thousands)
298 (ACTUAL Dollars)
299 Manpower Changes

PERSONNEL REQUIREMENTS REPORT — KANSAS CITY POLICE DEPT. — BUDGET OVERVIEW – 100 — APRIL 16, 1971

PLANNING ITEM	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
					STAFFING MODEL						
16 Total LE Personnel	1300	1312	1324	1336	1348	1361	1373	1386	1399	1412	1425
1 Patrolmen	880	888	897	906	915	924	934	943	952	962	972
2 Detective	144	145	147	149	151	152	154	156	158	160	162
3 Sergeant	196	197	198	200	201	203	204	206	208	209	211
4 Captain	47	47	47	47	47	47	47	47	47	47	47
5 Major	13	13	13	13	13	13	13	13	13	13	13
6 Major of Detectives	1	1	1	1	1	1	1	1	1	1	1
7 Lt Colonel	5	5	5	5	5	5	5	5	5	5	5
8 Senior Analyst Technician	2	2	2	2	2	2	2	2	2	2	2
9 Systems Analyst Technician	3	3	3	3	3	3	3	3	3	3	3
10 Program Research Technician	1	1	1	1	1	1	1	1	1	1	1
11 Program Technician I	0	0	0	0	0	0	0	0	0	0	0
12 Program Technician II	1	1	1	1	1	1	1	1	1	1	1
13 Helicopter Pilot Technician	5	5	5	5	5	5	5	5	5	5	5
14 Firearms-Evid Supv Technician	1	1	1	1	1	1	1	1	1	1	1
15 Public Info Supv Technician	1	1	1	1	1	1	1	1	1	1	1
18 Civilian Support Requirement	364	371	374	376	378	380	382	384	386	388	390
56 Total LE + Civ Personnel (FT)	1664	1684	1698	1712	1726	1741	1756	1771	1786	1801	1816

BUDGET SUMMARY REPORT — KANSAS CITY POLICE DEPT — BUDGET OVERVIEW - 100 — APRIL 16, 1971

PLANNING ITEM	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
			BUDGET CAPSULE								
			(DOLLARS IN THOUSANDS)								
190 Total Fiscal Req	20508	23218	24211	25226	26414	27531	28703	30062	31352	32706	34263
191 Police Service	18751	21205	22118	23051	24140	25166	26243	27490	28677	29922	31352
193 Personal Services	16026	18560	19292	20057	20967	21804	22677	23707	24662	25661	26827
200 A-1 Salaries	15036	17165	17832	18530	19370	20132	20928	21877	22747	23657	24730
271 Tot LE Salaries	12554	14274	14924	15603	16313	17055	17831	18643	19493	20380	21309
			(ACTUAL DOLLARS)								
146 LE Retirement	1484952	1712973	1790889	1872366	1957568	2046666	2139838	2237272	2339163	2445716	2557145
147 Civilian Retirement	147134	152762	153394	154032	161207	161873	162545	170097	170798	171507	179449
148 Civilian F.I.C.A.	131207	147005	147940	148894	155483	156491	157521	164481	165569	166680	174029
54 Total Civ Salaries (Ft)	2482400	2589190	2599899	2610714	2732326	2743611	2755008	2883003	2894893	2906901	3041512
221 Total Civ Hrly-Pt-Time	289448	301277	308805	316606	324689	333065	341744	350738	360056	369713	379718
62 Contractual Services Total	1414059	1442638	1523327	1609654	1702045	1800961	1906899	2020397	2142037	2272448	2412311
107 Commodities Total	769163	773964	825315	880104	938565	1000944	1067505	1138531	1214322	1295201	1381510
134 Capital Outlay Total	531457	429013	477892	503993	531540	560616	591306	623700	657895	693992	732098

DETAILED BUDGET ACCOUNT REPORT KANSAS CITY POLICE DEPT BUDGET OVERVIEW -100 APRIL 16, 1972

PLANNING ITEM	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
	PERSONAL SERVICES										
	(DOLLARS IN THOUSANDS)										
193 Personal Services	16026	18560	19292	20057	20967	21804	22677	23707	24662	25661	26827
200 A-1 Salaries	15036	17165	17832	18530	19370	20132	20928	21877	22747	23657	24730
	(ACTUAL DOLLARS)										
60 A-4 Extra Compensation	935438	1304855	1365306	1428560	1494749	1564008	1636479	1712312	1791662	1874694	1961577
61 A-9 Unclassified	79351	90216	94320	98611	103098	107791	112698	117829	123195	128807	134676
	CONTRACTUAL SERVICES										
62 Contractual Services Total	1414059	1442638	1523327	1609654	1702045	1800961	1906899	2020397	2142037	2272448	2412311
63 B1.1 Auditing + Accounting	7800	8267	8764	9289	9847	10438	11064	11728	12432	13177	13968
64 B1.7 Medical Exp-Non Inj	2000	500	500	500	500	500	500	500	500	500	500
65 B1.8 Veterinary Expenses	2000	2119	2247	2382	2524	2676	2837	3007	3187	3378	3581
66 B1.10 Professional Services	16468	17456	18503	19613	20790	22037	23360	24761	26247	27822	29491
67 B1.11 Educational Expense	33023	34073	36451	38996	41719	44632	47749	51084	54652	58470	62555
68 B1.13 Medical Exp-Inj	8400	9234	9879	10568	11306	12096	12941	13844	14812	15846	16953
69 B2.2 Local Transportation	4730	5013	5314	5633	5971	6329	6709	7112	7538	7991	8470
70 B2.3 Postage	14514	19302	19302	19302	19302	19302	19302	19302	19302	19302	19302
71 B2.4 Drayage, Frgt, Express	11000	11650	12359	13101	13887	14720	15603	16539	17532	18584	19699
72 B2.6 Travel Expense	6749	8686	9284	9923	10606	11337	12118	12953	13846	14800	15820
73 B3.1 Advertising	66591	11733	11850	11969	12088	12209	12331	12455	12579	12705	12832
74 B3.4 Printing-Duplicating	2000	2119	2247	2382	2524	2676	2837	3007	3187	3378	3581
75 B3.6 Promotional Expense	3000	3179	3370	3573	3787	4014	4255	4510	4781	5068	5372
76 B4.1 Fire E/C Insurance	8900	9433	10000	10600	11236	11910	12624	13382	14185	15036	15938
77 B4.2 Liability + Prop Ins	100616	106652	113052	119835	127025	134646	142725	151289	160366	169988	180187
78 B4.5 Notary Bond	400	400	400	400	400	400	400	400	400	400	400
79 B4.8 Hospitalization Ins	263455	257654	259819	262007	264216	266447	268701	270977	273276	275598	277943
80 B5.1 Gas	7310	7748	8213	8706	9228	9782	10369	10991	11651	12350	13091
81 B5.2 Electricity	72341	76681	82182	86159	91328	96808	102617	108774	115300	122218	129551
82 B5.3 Steam	7770	8236	8730	9254	9809	10398	11021	11683	12384	13127	13914
83 B5.4 Telegraph	14425	15290	16207	17180	18211	19303	20462	21689	22991	24370	25832
84 B5.5 Telephone	95300	101017	107079	113503	120314	127532	135184	143295	151893	161007	170667
85 B5.5 Time Clocks	2111	2237	2371	2514	2665	2824	2994	3174	3364	3566	3780
86 B5.5 Water	5915	6269	6646	7044	7467	7915	8390	8893	9427	9993	10592
87 B6.1 Bldg-Structural Repair	53250	56444	59831	63421	67226	71260	75536	80068	84872	89964	95362
88 B6.3 Repair Plant Equip	650	688	730	774	820	869	922	977	1036	1098	1164
89 B6.5 Repair Oper Equip	96632	102429	108575	115090	121995	129315	137074	145298	154016	163257	173053
90 B6.6 Repair Office Equip	14893	15786	16733	17737	18802	19930	21126	22393	23737	25161	26671
91 B7.1 Rent of Land	7300	7737	8202	8694	9216	9769	10355	10976	11635	12333	13073
92 B7.2 Rent of Building	87906	93180	98771	104697	110979	117638	124696	132178	140108	148515	157426
93 B7.4 Rent of Mach.	128926	136661	144861	153552	162766	172532	182883	193857	205488	217817	230886
94 B7.5 Rent of Office Equip	48485	55085	58707	62568	66684	71074	75754	80744	86065	91739	97789
99 B8.6 Investigation Expense	17900	23840	25578	27443	29443	31588	33888	36355	39000	41837	44879
101 B9.1 Cleaning + Printing	4900	5193	5505	5835	6186	6557	6950	7367	7809	8278	8775
102 B9.2 Disinfect + Exterminate	500	529	561	595	631	669	709	751	796	844	895

DETAILED BUDGET ACCOUNT REPORT	KANSAS CITY POLICE DEPT	BUDGET OVERVIEW -100	APRIL 16, 1972

	PLANNING ITEM	*1971*	*1972*	*1973*	*1974*	*1975*	*1976*	*1977*	*1978*	*1979*	*1980*	*1981*
	CONTRACTUAL SERVICES —(Cont.)											
103	B9.3 Dues + Memberships	2732	3286	3312	3338	3365	3392	3419	3446	3474	3502	3530
104	B9.5 Laundry + Sanitation	6925	7340	7780	8247	8742	9267	9823	10412	11037	11699	12401
105	B9.10 Contract Work	189356	208291	229120	252032	277236	304959	335455	369001	405901	446491	491140
106	B9.12 Tow-In Charges	1080	1169	1175	1181	1188	1195	1201	1208	1215	1222	1229
	COMMODITIES											
107	Commodities Total	769163	773964	825315	880104	938565	1000944	1067505	1138531	1214322	1295201	1381510
108	C1.1 Office Supplies	66000	70741	75616	80828	86400	92357	98727	105537	112818	120604	128928
110	C1.2 Magazines + Periodical	5364	5685	6026	6388	6771	7178	7608	8065	8549	9062	9606
111	C2.3 Chemicals	1000	1059	1123	1191	1262	1338	1418	1503	1593	1689	1790
112	C2.4 Cleaning + Sanitation	8380	8882	9415	9980	10579	11214	11887	12600	13356	14157	15007
113	C2.6 Feed	3000	3179	3370	3573	3787	4014	4255	4510	4781	5068	5372
114	C2.7 Food	21320	22599	23955	25392	26916	28530	30242	32057	33980	36019	38180
115	C2.8 Fuel Oil	200	211	224	238	252	267	283	300	318	337	358
116	C2.9 Institutional Supplies	612	648	687	728	772	818	868	920	975	1033	1095
117	C2.10 Licenses + Badges	3000	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500
118	C2.12 Lumber + Materials	3000	3179	3370	3573	3787	4014	4255	4510	4781	5068	5372
119	C2.13 Drugs + Medicines	1000	1167	1235	1308	1385	1466	1553	1644	1741	1844	1952
120	C2.14 Minor Equipment	123505	133879	143104	152968	163513	174787	186842	199730	213510	228243	243997
121	C2.15 Motor Vehicle Gas-Oil	218846	250955	267468	285075	303848	323866	345211	367971	392242	418124	445724
123	C2.16 Motor Vehicle Parts	146681	167991	179046	190832	203399	216799	231087	246324	262571	279896	298372
125	C2.17 Paint + Supplies	3050	3232	3426	3632	3850	4081	4326	4586	4861	5152	5462
126	C2.21 Wearing Apparel	132250	84802	90735	97082	103875	111143	118920	127243	136148	145678	155875
132	C2.23 First Aid Supplies	7000	7945	8388	8856	9350	9872	10423	11005	11621	12271	12957
133	C2.26 Reserve Equipment	5000	5299	5617	5955	6312	6691	7092	7518	7969	8447	8954
	CAPITAL OUTLAY											
134	Capital Outlay Total	531457	429013	477892	503993	531540	560616	591306	623700	657895	693992	732098
135	E3.7 Motor Vehicles	415750	366298	412224	435226	459522	485187	512297	540936	571189	603149	636913
138	E3.8 Office Equipment	1305	1383	1466	1554	1647	1746	1851	1962	2079	2204	2337
139	E3.9 Plant Equipment	7000	7139	7282	7428	7577	7728	7883	8040	8201	8365	8532
140	E3.11 Communications	90840	54191	56919	59783	62792	65953	69273	72761	76424	80272	84314
143	E3.16 Other Equipment	23562	3700	3737	3774	3812	3850	3889	3928	3967	4007	4047

OVERVIEW MODEL APPLICATION

The following section depicts a practical application of a COPPS Budget Overview Model. The occasion to use the model arose when the Commanding Officer, Planning and Research, received a note from the Chief requesting an immediate response to the question, "What if we add 50 patrolmen in 1973? What will it cost in terms of additional salaries, supporting equipment, etc.? What are the long-term implications of such an expansion?" The Commander of Planning and Research was able to render a quick response to each of these questions by making effective use of his departmental Budget Overview Model. The following pages describe in detail the chain of events which transpired from the time the Chief's note was received to the analysis of summary reports generated by the Overview Model.

Figure 5 shows graphically the impact on salary related costs created by the addition of 50 patrolmen to the force in 1973. The plan which includes the force addition (Run No. 103) may be compared on an annual basis with the projection originally programmed (Run No. 100). Also shown as a point of comparison is Run No. 102 which shows the net effect on salary related costs of giving across-the-board salary increases of 5% in 1974, 1977, and 1980. (No additional staffing considered.) It should be emphasized that each of the alternate runs (Run Nos. 102 and 103) were made by a simple one card change in the original Budget Overview Model.

The previous examples illustrate a small sampling of the kinds of in-depth analyses which can be performed using just one COPPS model. In a typical department the need frequently arises to address planning areas not explicitly treated in the Budget Overview Model or treated only on a gross basis. Facility planning, details of staffing requirements, analysis of retirement and fringe benefits, patrol or helicopter operations are but a few of the possibilities for application of the COPPS system. The output from one of these other models may provide useful information by itself or it may serve to refine input data to the Overview Model or some other model. It is only after development of a network of both independent and interrelated models that the full benefits of applying the COPPS system to police planning can be realized.

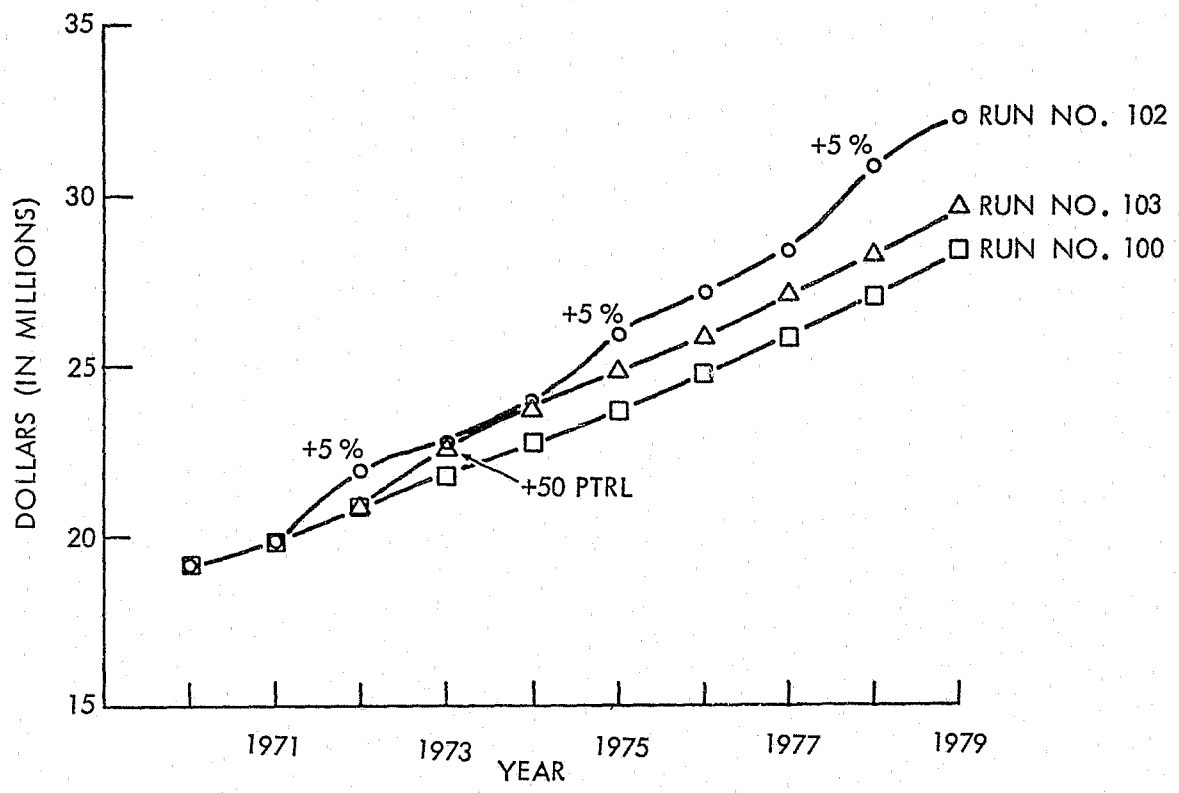


Figure 5--Projection of Salary Related (Personal Services) Costs

From the desk of . . .
THE CHIEF

9/30

To: Planning & Research
There is a possibility that we can get a one-time grant to pay for 50 additional patrolmen for one year in 1973. We would be responsible for needed equipment and other support.
What would this cost?

To: Chief of Police — September 30, 1971

From: Commanding Officer, Planning and Research

Subject: 1973 ADDITIONAL PATROLMEN GRANT REQUEST

The following tabulation represents a summary of the impact on our budget created by the expansion of the patrol force by 50 men in 1973. Using $9,000 per year as the starting salary in 1973, the amount of the grant would be $450,000 for 50 patrolmen. The department's fiscal requirements for that year will increase by $671,000, and in 1974, when outside funding is withdrawn, our total fiscal requirement will be nearly $1.1 million over that previously programmed. Included in this amount are additions of 10 detectives, 9 sergeants, and 11 civilian employees. Also included are 10 new patrol cars in addition to other equipment costs totaling $48,500.

We have the details through 1981, but the table below shows the major impact for the first few years.

	1973	*1974*	*1975*
TOTAL FISCAL REQUIREMENTS			
50 Additional Patrolmen	$25,332,000	$26,321,000	$27,573,000
Current Budget Overview	24,211,000	25,226,000	26,414,000
Net Difference	1,121,000	1,095,000	1,159,000
Applicable Grant Share	450,000	-0-	-0-
Net Budget Increase	$ 671,000	$ 1,095,000	$ 1,159,000

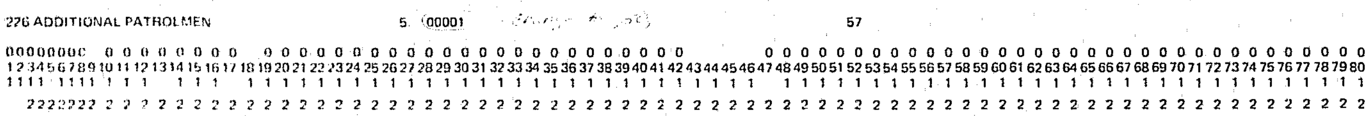
After receipt of the above note from the Chief, the Commander of Planning and Research was able to provide the information shown above in the memo, as well as have detailed back-up data, in approximately 2 hours. The elapsed time can be broken down as follows:

Study of the Chief's request:	15 min.	Wait for computer time:	60 min.
Review of the necessary changes in the Budget Overview Model:	30 min.	Computer processing time:	½ min.
Keypunch new program card:	5 min.	Extraction of information from summary reports:	10 min.
		Total elapsed time:	2 hrs. (approx.)

HOW IS COPPS RELATED TO THE CHIEF'S REQUEST?

A change in line 226 ADDITIONAL PATROLMEN of the Budget Overview Model just presented enabled the planner to add the required number of patrolmen to the force in the desired planning period. The addition of the 50 patrolmen did not disrupt the planned build-up of the department for any but the period specified. Thus, the 1 percent increase in total departmental growth, previously stipulated for each period, resumed after 1973 with the new patrolmen being included in the annual growth in subsequent years.

The card corresponding to line 226 in the original model with an annotation depicting the necessary change, is shown below.



The exact meaning of the coding instructions is discussed later and need not be of concern here. What is of significance, however, is that the net effect of the single card change above is to add 50 patrolmen to the force in the second planning period (1973) and that a multitude of other planning factors change as a result, within the model. By comparing the reports generated in this new model with those of the original model, the planner can see the across-the-board implications of a change in size in the patrol force. The material immediately following shows selected output from the two models. For ease of comparison, the line items from the current Budget Overview Model have been repeated and are shown immediately following the output from the +50 Patrolmen Model.

TOTAL LAW ENFORCEMENT SALARIES

Even though the required salaries for the 50 additional patrolmen can be easily hand calculated, the many other salary related planning items are not so readily determined without some structured mechanism for relating the factors and associated costs. The Overview Model provides the planner with just such a capability. By specifying line 271 of the model to be included in a summary report, the planner exercising the overview model generates the following data.

+50 Patrolmen Model

Planning Item	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
271 Tot LE Salaries (Dollars in Thousands)	12554	14274	15682	16396	17143	17924	18741	19596	20489	21423	22401

Current Budget Overview Model

Planning Item	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
271 Tot LE Salaries	12554	14274	14924	15603	16313	17055	17831	18643	19493	20380	21309

Comparing corresponding law enforcement salaries in the two models indicates that total law enforcement salary requirements would increase by some $758,000 in 1973 with the addition of 50 new patrolmen that year which represents considerably more than just the salaries paid the 50 new patrolmen. (See Additional Staffing Changes, below.)

ADDITIONAL STAFFING CHANGES

The difference in total law enforcement salaries includes salaries paid to additional detectives and sergeants required to support the expanded patrol force. The required number of patrolmen, detectives, and sergeants under the planned addition are included in the summary reports as lines 1, 2, and 3, respectively. To determine, for example, the number of additional sergeants required the planner compares line 3 SERGEANT in both models for 1973. The difference in the 207 and 198 shown below indicates the number of new sergeants needed to support the increased patrol force.

+ 50 Patrolmen Model

Planning Item	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
1 Patrolmen	880	888	948	958	967	977	987	997	1007	1017	1027
2 Detective	144	145	157	159	161	163	165	167	169	171	173
3 Sergeant	196	197	207	208	210	212	213	215	217	218	220

Current Budget Overview Model

Planning Item	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
1 Patrolmen	880	888	897	906	915	924	934	943	952	962	972
2 Detective	144	145	147	149	151	152	154	156	158	160	162
3 Sergeant	196	197	198	200	201	203	204	206	208	209	211

TOTAL FISCAL REQUIREMENTS

The difference in the total fiscal requirements for 1973 and the following years includes more than just the increase in total law enforcement salaries paid to new patrolmen, sergeants and detectives. The increase in total law enforcement salaries will be accompanied by corresponding increases in associated fringe benefits; new civilians (clerk-typists) will have to be hired; new equipment including patrol cars, radios, uniforms, etc., will have to be purchased. By comparing the line 190 TOTAL FISCAL REQ output in the two models the planner is able to see the net effect of all of these changes. As is shown below, the budget increase is over $1.1 million in 1973.

+ 50 Patrolmen Model

Planning Item	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
190 Total Fiscal Req (Dollars in Thousands)	20508	23218	25332	26321	27573	28742	29969	31387	32737	34154	35778

Current Budget Overview Model

Planning Item	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
190 Total Fiscal Req (Dollars in Thousands)	20508	23218	24211	25226	26414	27531	28703	30062	31352	32706	34263

CAPITAL OUTLAY TOTAL

If the planner is also interested in the total increase in some component of the total budget, say Capital Outlay, he would include line 134 in his summary report with the following data being generated.

+ 50 Patrolmen Model

Planning Item	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
134 Capital Outlay Total	531457	429013	526426	504607	546202	576165	607796	641188	676441	713660	752955

Current Budget Overview Model

Planning Item	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
134 Capital Outlay Total	531457	429013	477892	503993	531540	560616	591306	623700	657895	693992	732098

A comparison of total expenditures for Capital Outlay reveals that the addition of 50 more patrolmen in 1973 results in an increase of more than $48,500, representing costs to purchase additional patrol cars and other items of equipment.

PATROL CAR REQUIREMENT

If the planner wishes to examine in detail the associated build-up of any of the Capital Outlay accounts he merely specifies its line number in the planning model for inclusion in a summary report. If, however, he chooses to look at a planning item which was not included in the summary report from the current Budget Overview Model, direct comparisons can still be made between a report line from the +50 Patrolmen Model and the corresponding line in the planning matrix of the current Budget Overview Model. Such a comparison is made possible since, preceding the summary report section of each COPPS model, is shown the entire matrix of planning items included in that model. Any information not included in the summary report may still be obtained by the planner by an analysis of the planning matrix. A printout of line 150, PATROL CAR REQUIREMENT, from the +50 Patrolmen Model and of line 150 from the planning matrix of the current Budget Overview Model is shown below. While the format of the two lines differ, the necessary data for comparison of the patrol car requirement under the two plans are readily available. (Corresponding data depicting patrol car requirement in 1973 are circled below.)

+ 50 Patrolmen Model

Planning Item	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
150 Patrol Car Requirement	323	324	(336)	338	340	342	344	346	348	350	352

Planning Matrix, Current Budget Overview Model

150 -0 Patrol Car Requirement 323.0 6 0.00L 275+ 323.00 0 0.00 0 0.00 0 000 INTO -0

Base	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
323.0	324.8	(326.5)	328.3	330.1	332.0	333 8	335.7	337.6	339.5	341.4

COPPS INTERFACE WITH EXISTING POLICE OPERATIONS

A police planning model that accurately reflects the complex and dynamic interrelationships of organizational elements has several significant advantages. The planning model can:

- Stimulate the imagination and improve perspectives.
- Assist in designing, manipulation, and examining various frames of reference.
- Facilitate communication among the people involved in planning the policy making by presenting a physical point of reference.
- Clarify and examine issues and focus effort on the major ones.
- Teach the planners and policy-makers improved planning techniques by permitting insight into patterns and trends.
- Develop contingency plans and anticipate crisis with planned action.
- Create methodologies, procedures, and frameworks for problem solving.

COPPS is designed to be an extension of existing planning operations found throughout the department. Since COPPS is a system for planning and not just a single model it can address the specific problems of a unit or bureau, or it can be applied to the department as a whole, as in the case of a budget overview model. COPPS is a tool whereby departmental planning, at whatever level, can be made more accurate, rapid, and extensive than ever before. Traditionally, many of the smaller departments have accomplished planning by an intuitive or "years of experience" approach. Planners in some larger departments depend upon computer specialists for planning analyses. Regardless of department size or the status to which the planning process has been relegated, the COPPS system successfully bridges the gap between departmental

planning needs on the one hand, and the powerful problem-solving aid, the electronic computer, on the other.

SYSTEM CHARACTERISTICS AND REQUIREMENTS

The system characteristics and requirements found in most departments are normally compatible with existing hardware configurations. Two basic modules are included in COPPS software package: (1) a language translator written in COBOL F and (2) a matrix manipulator written in FORTRAN IV. No absolute core requirements are specified. System has been installed on such diverse machines as: IBM 360/40, 360/50, and 1130; Burrough B5500; CDC 6400, 3200, and 3300; UNIVAC 1108, and SPECTRA 70/35. Usual card selector channel devices—card reader and printer are required. Though COPPS is not written for interactive operation it can be accessed via terminal installations. Program run time varies according to the hardware configuration and size of model. Average cp time for a 250 line model run on the CDC 6400 is on the order of 10 to 15 seconds. Elapsed time from card read-in to print out averages 5 to 7 minutes. No system maintenance is required—the user makes any desired model changes and data updating. Installation of the system would place an additional keypunch requirement of approximately 1,000 to 2,000 cards annually.

FUTURE PLANS FOR COPPS

The planning system described, herein, represents a significant development in enhancing the effectiveness of the police planner. Even though the reception of the original COPPS system has been enthusiastic, an improved version is under development. System user comments and suggestions have been incorporated into a soon-to-be-announced COPPS II system.

COPPS II will provide planners with greater capability than ever before to develop models of their departments and will accommodate up to 10,000 planning items. (The current system is limited to 300 planning items in a single model.) Some of the other new features designed are an expansion of the instruction set, optional 6- or 12-period planning horizons, optional heading term insertion (to accommodate month titles), and increased system error messages and diagnostics. Significantly, COPPS II has been designed to accommodate installation on smaller computer configurations. The system has been pretested on machines as small as 46,000 bytes and utilizes direct-access disk devices.

END