King County

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DEPARTMENT OF BUDGET AND PROGRAM PLANNING

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AN ANALYSIS OF A COMPUTER-ASSISTED DISPATCH SYSTEM for KING COUNTY DEPARTMENT OF PUBLIC SAFETY

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Background

This grant application is the first part of a two-part project designed to automate the communications dispatching and data collection system in Public Safety.

The current dispatching system is manually operated and involves the following:

- the receipt of an incoming request for service by a complaint clerk who enters the pertinent information concerning the call onto an incident card.
- the card is time-stamped to indicate when the call was received and hand-delivered to a radio dispatcher by the clerk.
- the radio dispatcher assigns a field unit to respond to the request and time-stamps the incident card accordingly.
- the dispatcher time-stamps the incident card when the field unit arrives at the scene and again when the unit clears.
- the dispatcher retains the incident card until clearance in order to track the status, location, and activity of the field unit.

Normally a radio dispatcher is assigned responsibility for one precinct or ten patrol cars; however, total field unit responsibility can vary with the number of investigative, traffic, and other special units operating in the precinct area.

Information relating to response time, unit responding, location of incident by patrol district, and type of incident are later keypunched for batch entry into the County's computer system. Response time data is summarized and monthly statistical reports are prepared

based on this information. With the proposed automation, the system would operate as follows:

- the complaint clerk would be stationed at a computer-linked video display device into which information concerning a request for service would be entered by typing, including the time when the call is received.
- the radio dispatch station would be equipped with a similar video-display device onto which call-receipt data collected at the complaint station could be transferred.
- the video display at the dispatch station is modified for a split screen so that the status, location and activities of precinct field units can be recalled by the dispatcher and displayed along with the data concerning the request for service.
- the radio dispatcher will assign a field unit to the incident and enter the times of dispatching, of unit arrival and of unit clearance as the events occur.

Information regarding requests for service (type of incident, patrol district, unit responding, etc.) would be computerized automatically for storage and future recall.

Cost Factors

The proposed grant requests $44,000 of LEAA discretionary funds and $4,890 of County funds for the purpose of preparing a systems design and for detailing the specification of the equipment to be used in Part Two of the project, the implementation phase. This grant, if approved, would provide funding for two planner/analysts, a specialized training program for communications and patrol personnel (books, materials, etc.) and travel for the planner/analysts

to select police agencies around the country operating similar automated dispatching systems. To implement the project, current plans call for an initial capital request of 17 video display units at approximately $10,000 per unit, three remote terminals, one to each precinct, at approximately $10,000 per terminal, and $15,000 for a line printer (to record all incident data so that in the event the system breaks down, dispatching can be performed manually without the loss of outstanding dispatch information). Based on these estimates, total capital outlay costs would exceed $200,000 in the first year. This figure excludes the costs of purchasing additional computer core for Systems Services. Ongoing operating and maintenance costs of the system have been calculated by the Department to range between $260,000 if the equipment were to be purchased and $320,000 per year and possibly higher if the equipment were leased. There is a possibility that LEAA could finance the capital equipment purchases; the O&M costs, as well as all equipment replacement costs, would be borne by the County out of Current Expense. Public Safety has identified as savings to the County approximately $23,000-$25,000 of keypunch time (though not necessarily translated into budget reductions) in Systems Services and the avoidance of future communication personnel costs.

Issues

The difficulties with this project concern the principal reasons given by the Department for its implementation.

1. The time-savings in the communications center to which the grant speaks are marginal when viewed in the context of other less costly management options, i.e., the installation of conveyor belts coupled with the application of industrial engineering techniques to the operation of the communications center. The complaint

clerk will still receive the call, collect information on the incident, and transfer that information to the radio dispatcher. The dispatcher will still review the status, location and activities of precinct field units, transmit incident information to an available field unit before dispatch, record the time the unit was dispatched, the time the unit arrived at the scene of the incident and the time the unit cleared from the incident. The basic tasks of the dispatch process are still the same, even if the system is automated. Voice communication between the complaint clerk and the citizen and the radio dispatcher and the field unit will still exist and still account for the bulk of the total call-receipt to dispatch-of-field-unit time. Some time-savings would be generated by eliminating the need for the hand-transfer of the dispatch card from complaint clerk to dispatcher. However, almost the same time-savings could be achieved by other less-costly methods.

2. The grant application states that King County is committed to implementing 911 primary call receiving and that computer-assisted dispatch is necessary to operate that system. This may be a mistaken assumption for the Executive has already gone on record before the suburban mayors as being reluctant to implement the costly 911 system during a time of severe budget constraints for the County. It is probably true that computer-assisted dispatch is required to operate a "911" system but we know of no policy which commits the County to establishing this system in the immediate future.

3. The grant also addresses two other characteristics of "CAD" which Public Safety considers beneficial to the County. The first relates to a reduction in the loss of incoming calls during peak load periods (i.e., a reduction in number of calls in which a party

hangs up before the complaint clerk answers the phone). While the number of calls lost during these periods is undeterminable, one could safely assume that such incidents probably are not so urgent and significant as to require immediate patrol response or the caller would have remained on the request-for-service line until a complaint clerk answered.

The second benefit concerns the avoided cost of adding communications personnel to absorb the growth anticipated by Public Safety in requests for police service. As was noted in (1) above, even with automated dispatching process, response time saving will probably be minimal at the margin. Since the basic functions are left unchanged, time savings would be small, resulting in little if any personnel cost-savings. If we are to assume without verification the growth in call-requests for service which DPS projects (10%/year) the County is facing some increase in communications operators, regardless of whether the automating process is installed or the manual process is left unchanged.

Conclusions

1. The question of time-savings in a C-A dispatching process is seriously discounted by Public Safety's unwillingness to commit to immediate personnel reductions in the communications center, if the system were to be implemented. This, coupled with the fact that the basic police communications procedure remains intact, leads us to conclude that no real time-savings in an automated process will occur and consequently manhour savings reflected in budgeted reductions will not accrue to the County. In our estimation the real effect of the proposed project on the communications

center is that of eliminating the use of the time-stamp machine and the incident card, and the manual transfer of this card from complaint clerk to radio dispatcher. The difference is in procedure and this difference ought to be measured in terms of translating call-receipt information to card form for manual transfer as opposed to keypunching information on-line for video display and automatic transfer. The Seattle Police Department, which operates a computer-assisted dispatch system similar to the one proposed by Public Safety, experienced no significant time-savings after conversion of their conveyor belt-aided manual system to CAD. (See Appendix B.) The reason for proceeding with an automated dispatch system in Seattle was not based upon some efficiency problem in their communications center. Rather the system was justified on other grounds including overloaded radio frequencies, FCC restrictions on obtaining additional radio frequencies and an inordinate number of field units per radio dispatcher. These conditions do not and will not pertain to unincorporated King County for many years. (By this time the proposed system would probably be obsolete as the result of new technological developments.) With respect to the manual transfer of information between the call-receipt and dispatch stations, the experience of Seattle would suggest that the installation of conveyor-belt equipment and the proper positioning of complaint clerk and dispatch station, coupled with other improvements, could substantially solve the existing operating problems. As was stated previously, the very nature of the communication process requires the manning of a complaint station and a dispatch station. The proposed system as an alternative over the above suggested improvements at best would only serve to reduce the incidence of

lost calls (a problem whose magnitude has not been demonstrated) due to a slight reduction in the time to process a call at the complaint station.

2. To justify C-A dispatching on the grounds that the County is committed to a 911 emergency call-receiving system is misleading. Admittedly, 911 probably cannot become operational without C-A dispatching. Due to the present County financial situation, no such commitment has been made to 911. Until County government makes a definite move in the direction of 911 by, for instance, requesting suburban contributions to the cost of the system or committing to countywide call-receiving for emergency medical service, a justification of C-A dispatching for reasons of 911 is premature.

3. The issue of lost incoming calls is not a serious consideration for if these calls were of a critical nature, the callers are likely to remain on the request-for-service line until a complaint clerk has responded to their call. The majority of these calls are probably the nonemergency type, either general information requests or citizen complaints which can be handled by communications center personnel, and would not require field officer response.

4. The singularly most persuasive justification for CAD rests with its ability to collect complete information on dispatch events at the time of occurrence. This feature eliminates the chance for keypunch error as dispatch information would be prepared for computer entry at the point of arrival in the communications center, rather than later being keypunched for batch entry. Because the keypunch process would have been eliminated, computer readouts on the volume, type, and location of criminal and other police

activity could be prepared daily as opposed to weekly and monthly reports, as is now the case.

A flaw in this justification is the fact that no crime analysis unit exists in Public Safety to make use of such information. The formation of one is being contemplated by management; however, no action has been taken to date with respect to its implementation.

Even if the crime analysis capability existed, the use of computer-assisted dispatch as a data collection device with manpower allocation and crime analysis implications would have major benefits only if unincorporated King County were densely populated in which case gross shifts in manpower would be possible and might have substantial impact on crime. This is not the current situation, so the most adequate rationale for this expenditure is seriously discounted as premature. At the time the City of Seattle implemented CAD in 1973, approximately 510 patrolmen were patrolling 61 separate patrol areas, and responding to requests from half-a-million citizens in an 80-square-mile area. In 1975, Public Safety patrols 30 patrol areas with 185 patrolmen, responding to requests from a total population of 410,000 citizens in a 2,000-square-mile area.

And even further, if the capability did exist for daily crime reports and if the geographical and population conditions and manpower levels were such that shifts in manpower deployment could be productive, information on changes in crime patterns would not exist in sufficient quantity to base manpower allocations on until a period of time has elapsed in which to observe and make projections upon the changes, obviating the need for daily reports. If Public Safety considered the location, type and volume of crime to be the prime basis on which to allocate manpower, this information is available under the present batch system of crime data storage.

(For a further treatment of the data collection capabilities of the proposed system see Appendix A.)

Summary

The justifications given by Public Safety for this project do not support ongoing annual operation costs of $320,000 or a capital outlay in excess of $200,000 and ongoing costs of $260,000 for these reasons:

1. Time-savings or manpower savings in the communications center are marginal when considered in the context of other less-costly alternatives. There could possibly be some small time-savings at the complaint station where the incident card writing would be eliminated; however, this improvement ought to be balanced against the additional time required by the system for dispatching and also the added responsibility which the radio dispatcher would assume. These factors on balance result in no real difference in terms of communications center dispatch time between the new system and one which embraces the qualities of an efficient manual system. Moreover, growth in the number of citizen requests for service received in the communications center or a contraction in the size of patrol districts and the addition of field units bear no relationship to the system employed. If more calls are received, more complaint operators will be used; if more field units are in operation through a reduction in the size of patrol districts, more radio dispatchers will be used, regardless of whether a manual or an automated system is in use.

2. 911 primary call receiving is insufficient justification as discussed previously.

3. Lost incoming calls have not been demonstrated by DPS to be an important consideration.

4. The data collection capabilities of the proposed system are valuable, yet some of the reports to be generated are of little utility in an area with the geographical and population conditions of unincorporated King County and the manpower levels of Public Safety; these, as well as most of the other reports contemplated for production under the proposed system, could still be provided given the completion of certain refinements to the existing system.

Recommendations

We recommend not implementing the proposed computer-assisted dispatch system at this time.

We propose as an alternative means of partially solving Public Safety data problems the following method of collecting and preparing information for reporting purposes (see Appendix A for additional information):

- redesign dispatch incident card to include a space for police officer serial numbers;
- include in the keypunching process the collection of the police officer serial number and the address of the incident;
- develop programs for the manipulation, storage, and recall of the additional as well as possibly the existing pieces of information collected off the dispatch incident card;
- print the "officer monthly activity" report, the "interesting location" report, the "incident report by district" and the "recap of traffic accident investigation" report as needed;
- print the complaint investigation log report and test its efficiency on a trial basis to determine if an officer can still verify his patrol activity after the passage of some interval of time (1-3 days);

- continue to maintain personnel records manually.

The initial cost of implementing this alternative includes approximately $45,000 for the salary and benefits of two program analysts for one year and a minimal amount for redesign of the dispatch incident card.

With only a minimal amount of additional information to be keypunched, the additional cost of keypunching should be negligible. The prime ongoing O&M cost of the system would be the cost of printing the additional reports or approximately $10,000-$15,000*.

We also propose as an alternative means of alleviating the time-motion problem in the communications center the purchase and installation of a conveyor belt. The cost of this equipment would range from $2,000 to $10,000, depending on the type of equipment purchased and whether it is new or used. This, coupled with some industrial engineering in the communications center, ought to substantially improve the currently unwieldy dispatch process and reduce communications center response time by nearly the same extent as that anticipated for CAD.

In summary, the one-time costs of our proposal should run approximately $55,000 with ongoing O&M costs ranging from $10,000 to $15,000 per year.

* estimate only

APPENDIX A

The following outlines the reports which Public Safety currently plans on automatically generating with the implementation of the proposed computer-assisted dispatch system:

1. Personnel Recap Report

The purpose of this report is to document which shifts police officers and communications operators are assigned and present for duty on. This task is presently being performed manually by supervisory personnel. The advantage to the automated technique is in reduced time and effort to verify the number of personnel on each duty shift.

2. Roll-Call Training Report

This report is intended to inform patrolmen beginning their duty shift of the police activity which occurred in their patrol district, precinct, and adjoining precincts during the previous shift. If we are to assume that this type of information is valuable and is not being adequately disseminated verbally now, then possibly this report could be of some utility. It seems to us, however, that minor, routine police incidents are not critical for report to an oncoming shift and that major incidents will be immediately communicated by supervisory personnel during a briefing session prior to shift, with supplemental reports from officers coming off duty. If this is the case the report will only generate unnecessary information and replicate information already available from other sources. The need for this report is not easily and strongly defensible.

3. Complaint Investigation Log

This report will produce a record of an officer's activity during a shift and will be prepared for verification and signature

by the officer at the completion of his shift. It is designed and intended to replace the officer investigation log now prepared manually by patrolmen and whose preparation Public Safety will argue occupies about 15 minutes of a patrolman's work schedule.

4. Case Number to Event Number Cross Reference

This report will match on a daily basis case report numbers with dispatch event numbers in order to prevent the loss of a case number and to alert the records and identification section on the case workload to anticipate for indexing and filing. This is not a critical nor necessary report, and its real usefulness could easily be called into question.

5. Face Sheets

These reports are now manually prepared by patrol or communications supervisors on all major police incidents for review by the sheriff and the two bureau chiefs. The purpose is to furnish a quick briefing to the Department's administration in the event high-level policy direction is required on the incident, a press briefing is in order, or outside agencies or citizens have questions or comments on the police action taken. To automate this particular report process will reduce the amount of personnel time now required to manually prepare the report.

6. Officer Monthly Activity Report

This report will summarize by day, month, quarter, and year the activity of patrolmen and communications operators for purposes of supervision and management control. Supervisors now prepare these reports manually by gathering the pertinent information on the officer's activity from his complaint investigation logs.

7. Interesting Location Report

This report will feature a grouping of incidents occurring at a particular location according to the address of the location. The intent is to alert officers to problem areas within their patrol district by isolating recurring locations of police incidents.

8. Incident Report by District

This report would be a compilation of incidents (by address) occurring in a district for each day of the week. Presumably this and the following report are tools to be used by management for the purpose of manpower allocation. However, because of the geographic and population characteristics of the County vis-a-vis patrol manpower, the use of this report would be somewhat limited.

9. District Event Activity

This report would generate a histogram of the number of police events occurring in a patrol district by hour of the day for each day of the week.

10. Detailed Recap of Traffic Accident Investigations

This report will list the date, time, location and unit(s) responding to traffic accidents. This information is now being manually collected for forwarding to the State Patrol. Other than for this purpose, it is unclear what further value this report is to the Department.

11. Traffic Accident Investigation Summary

This report would summarize the number of traffic accident investigations based on some time interval (hour, day, week) and would be presented in a histogram format.

Conclusions

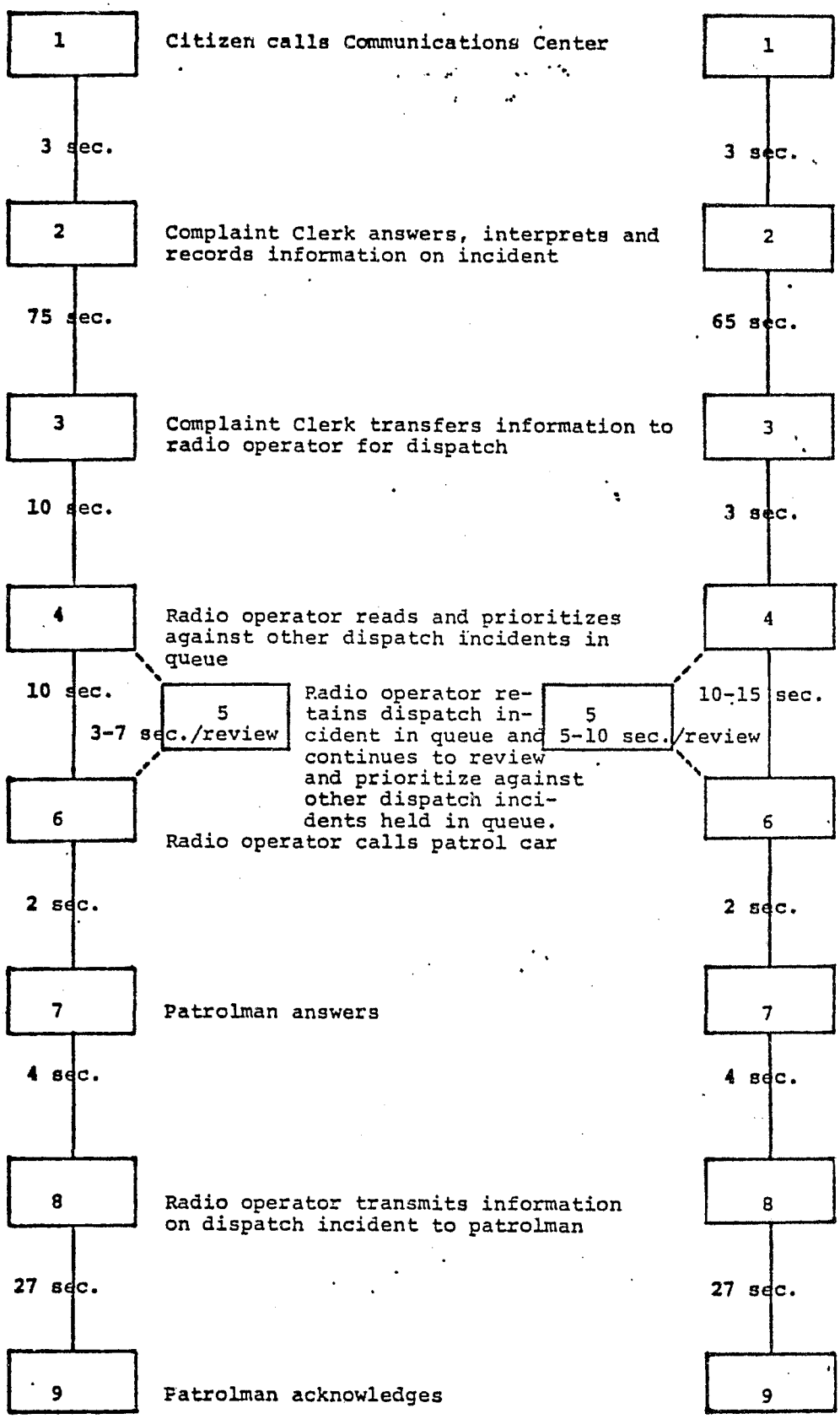
On the majority of these reports the prime pieces of data which are not presently being keypunched for batch entry are the address of the incident and the serial number of the patrol officer responding. If this information were collected and programs were developed for the purpose of presenting this information in a report format, each of the above reports with the exception of the "personnel recap" and the "face sheet" could be prepared on the current system. With the face sheet, it is questionable whether in practice the Department will rely totally upon the computer to prepare this information for use by high Departmental officials. On major incidents requiring face sheet documentation the chain-of-command will undoubtedly take care in reviewing and editing information as it flows through channels. This occurs now and if it continues it would diminish the usefulness of automating this report process.

The problems with preparing the roll-call training and complaint log reports under the present system concern its failure to prepare the data in a "real" time frame. Both reports could be developed with some lag time involved; however, any time lag would severely limit the value of the roll-call training report. The complaint investigation log would probably have to be tested on a trial basis to determine whether patrolmen have the ability to sufficiently recall their activity from previous shifts for report-verification purposes.

Other reports which are now being produced off the current system and for which computer programs have already been developed include:

- Part I offenses by district
- Part II offenses by district
- juvenile runaway report
- assaults on officers report
- council response time report

Each of the above reports will continue to be produced if CAD is implemented.



Comparison of manual (with conveyor belt) and computer-assisted dispatch systems of the Seattle Police Department. Source: Seattle Police Department, Communications Section.

APPENDIX C

	# of Complaint Clerks	# of Radio Operators
1969	12	3
1970	13	5
1971	14	5
1972	14	10
1973	24	12
1974	25	13
1975	25	13
	109% increase 1969-1975	333% increase 1969-1975

	Calls	Dispatches
1969	179,603	53,881
1970	227,200	68,160
1971	318,427	95,528
1972	350,193	105,058
1973	352,967	105,890
1974	392,000	109,000
	118% increase 1969-1974	102% increase 1969-1974

Changes in communications personnel and volume of work activity since 1969.

END

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