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Implementing Information and Computer
Technology to the Urban Police Functions
Through Systems Analysis

Center for Planning & Development Research: Institute of Urban & Regional Development
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IMPLEMENTING INFORMATION AND COMPUTER TECHNOLOGY TO THE URBAN POLICE FUNCTIONS THROUGH SYSTEMS ANALYSIS:

A Preliminary Study¹

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We reproduce here part of an article contributed to an American conference on operational research. Readers may find the terminology unfamiliar and the approach rather more cautious than ours, but stay with it and you will also find a remarkable amount of agreement with current thought on this side of the Atlantic.



Surveillance (Patrol)

The Officer on patrol is a rather unique organisational entity. He can be considered to be a manager, if one defines managers as individuals whose primary function is decision-making, and yet, he is the lowest operational member of the police department.² He is required in any given day to make a large number of immediate decisions on what are, in fact, exceedingly complex questions.³ He has

very little recourse to outside assistance to evaluate the consequences of his decisions, and he must make these decisions on the basis of highly uncertain and incomplete information and assertions.

It would appear, if we assume that it is possible to assign officers to patrol activities which tend to accomplish the derivative objectives of the public safety objective, that one way to improve the efficiency of the patrolman, decision-maker in the field, is to increase his ability to rapidly determine the consequences of the various alternatives in relation to any given decision or decision process.

To effectively provide the officer on patrol with information concerning consequences, we need at least two systems. First, an information system which is capable of storing the large variety of information, receiving needed information rapidly and making series of calculations based upon the combination of stored data and simple inputs from the field decision-maker. This task is well within the reach of today's state of the art, for both NASA and DOD have designed computerized systems of at least this complexity. The designed concepts

¹ Presented at the 12th Annual Meeting of the Western Section of the Operations Research Society of America, June 1966, Lake Tahoe, Nevada. This work was supported in part by National Aeronautics and Space Administration Grant No. NGR-05-003-125 (Technology and Urban Management) to the Space Sciences Laboratory and the Centre for Planning and Development Research, University of California, Berkeley.

² Discussions with Lt. W. W. Herrmann - 1965.

³ Bristow - 1957 notes at least four criteria on which the patrolman decision-maker must evaluate his alternatives: (1) legal, (2) precedent, both judicial and public policy, (3) press and public relations, and (4) internal (police department) relations.

used in existing automatic check out and spaceflight control systems should provide the means of acquisition, reduction, and analysis of the inputs to return the necessary information to the officer in the field without hampering response time significantly.

Second, we need an efficient means by which the patrol officer can communicate with the system. Again, the NASA developed computer and electronic communication technology, which provides space-satellite control and communication might provide another area of spin-off to urban management. The devices which the astronauts use to both transmit and receive information, as well as those sensing devices which automatically report changes in the ship's external and internal environment, would seem to be especially applicable.

A typical inquiry made by an officer of the system might be to request the precedents, given some set conditions of arrest and/or search of a suspicious individual when the officer did not have a search warrant, and the effects upon later acceptability of the evidence. If the system indicated that it would not be advisable to enter without a warrant, it could indicate the most efficient means to obtain same and to estimate how long it would take to obtain a warrant. As a longer range proposal, given appropriate revision of existing law, it might be possible to transmit the circumstances to a judge and to receive a facsimile warrant through equipment in the patrol car.

Prevention

"Certain offences may be considered as 'Preventable' while others may not. Crimes such as homicide, rape, aggravated assault, and others because of the passions (as opposed to reasons) usually motivating them, are not responsive to the mere knowledge that the police are present and will take steps to prevent them. Offences in the general group containing crimes of stealth (burglary, theft, auto theft etc.), on the other hand, do seem to respond to increased preventive effort".⁴

It is the very nature of crimes of stealth which makes efforts of apprehension relatively ineffective.

The criminal who operates in this area carefully selects those places, situations, time and types of property in which the probability of apprehension is at a minimum. It would seem to be particularly relevant for a systems analysis effort to focus on the conditions under which this type of crime is most likely to occur.

The recommendations as to the means of preventing crimes of stealth could take a number of forms:

1. Provide additional police protection in areas with a high likelihood of crime. This may well require a resource allocation system with an exceedingly short reaction time and an accompanying system capable of rapidly recognising changes in aggregate crime patterns.
2. Changes in the penalties for conviction of crimes of stealth. It has been in this area of prevention that much of the effort of law enforcement officials has already been applied.
3. Reduce the ability of criminals to utilize or dispose of stolen merchandise.
4. Statistical studies to indicate the casual conditions in which this group of crimes occur. The effect of street lighting and other physical attributes on crime levels is presently known.⁵

Cost effectiveness analysis would indicate the value of additional lighting particularly in areas and locations having an abnormally high incidence of crime. The use of direct warning systems in armored trucks, liquor stores, service stations, and supermarkets would be a considerable deterrent.

All of the above, with the exception of the changes in penalties for conviction,⁶ would appear to have a good probability of success and significant applications of technological spin-off.

The suggestion for a resource allocation system could be accomplished through systems similar to the defence department developed command and control systems. The systems could use computer graphics to display the existing deployment of

⁴ Quoted from R. Smith - 1961, pp 35-36. Also Smith cites a study which indicates that "... special indirect techniques seem to have a fair amount of success in reducing frequency of certain crimes related to vice." From NARCOTICS, ADDICTION AND NALLINE, Oakland, Calif., Police Dept., 1958 p 10 (R. Smith, p 36).

⁵ Discussions with Herrmann - 1965.

⁶ The significantly stiffer penalties for bank robbery do not seem to have as great an effect if the criminal believes the probability of apprehension is low; e.g. the large number of small (in dollar value) quick bank robberies.

forces, both professional and equipment; geographical areas with increased intensity of crimes; and the number and present assignment of officers who could be relocated to help combat crime in the areas of increased intensity.

The system could also present a periodic, (hourly, daily, weekly, etc.) allocation of department resources by area; e.g. beat. This might be used to re-allocate officers to new beats, other divisions, etc., in the face of changing requirements. The periodic requirements information (based upon variations in the level of crime, as an example) could be fed into the system and an alternative resource allocation could be proposed which would reduce the "average gap between resources and requirements for each beat or division". Such an allocation could indicate the sources and destinations of the resources to be transferred, so that the administrative and supervisory units could determine the feasibility of the allocation. The process could conceivably be an iterative process wherein the supervisory officers constrained the system from allocations which they felt were not practical.

This system critically depends upon a means of measuring 'normal' levels of activity, wherein the normal is defined in dynamic rather than static terms.

The design of systems with similar capabilities has been accomplished by DOD in its SAGE system and its tactical command and control systems, and NASA in its space flight control systems so that the problem would appear to be one of implementing existing technology into a civilian use.

The suggestion to reduce the ability of criminals to dispose of stolen goods could be accomplished through at least two means:

1. By marking easily disposable articles with the owner's name and city. The methods of marking part numbers on components of space vehicles should provide the technology to develop inexpensive and innocuous means of identifying personal property either at point of sale or at police department approved locations.
2. By requiring better identification of sellers of expensive goods and requiring transfer of identifying information or original seller to future bills of sale. The knowledge by criminals and fences that this information would be periodically processed and analyzed to check on multiple sales by individuals not normally engaged in buying and selling these items, and types of purchases made by pawnbrokers,

jewellers and other 'legitimate' sources, might serve as a significant deterrent to this type of crime. In the opinion of many operatives and authorities⁷ in the field, it is the relative inability of the police to analyze and trace through economically, the massive amount of data on these items is what makes apprehension so unlikely.

The direct warning system could be required by law of establishments under existing licencing requirements, in much the way attractive nuisances are required to take precautions. The technology would have to provide a relatively inexpensive means by which the trouble (possible crime) was communicated to a central unit. The means to communicate the basic information to field (patrol car) could be accomplished through a localized real-time application of the suggested command and control system. Also, variations of missile automatic check-out systems could be used to perform many of the existing routine patrol activities, thereby releasing patrol officers to perform other functions. Another type of warning system which could directly use space effort developed technology would be a burglar alarm with a self-contained power source which could be charged daily during working hours, and which would transmit a radio warning message to the local police sub-stations. The device would be much like the meteor warning devices or a form of moving object radar similar to that used in aircraft ground control operations. (These devices used a screening device to reject impulses from stationary objects). Rather than transmit the impulse of movement to a cathode ray tube, as is the case of radar, a radio transmission would be initiated.

It would seem from the alternatives in this rather preliminary study, that there would be a large number of possible applications of space and defence technology in the area of crime prevention.

⁷ Discussion - A. Jones, *Beach City Chevrolet* - 1965. R. Rehm, *Motors Insurance Corp.* - 1965, and W. Herrmann, *L.A.P.D.*, - 1965.

⁸ This problem was brought to light during discussion with A. Jones - 1965. Possible solutions were discussed with Jones - 1965, Rehm - 1965 and with Lt. Herrmann - 1965.

An Example of a Possible System's Solution to a Problem in Public Protection⁸

Professional auto theft, in Southern California at least, in response to increased efforts by law enforcement officials, is taking new forms. Typically, an auto is stolen, stripped of its most valuable and saleable items and an attempt at destruction is made. Those items which can easily find their way into legitimate outlets are of course the most desirable.⁹ At present, the 'hottest' item is the sets of bucket seats from top-line Chevrolets, Pontiacs and Fords. A front and back set of these seats sells new for approximately \$800.00 with an eight to ten week wait for delivery from the factory. These items have now reached a 'used' price from salvage dealers of about \$500.00 per set. A survey of the Los Angeles and Orange Counties Auto Wreckers News indicated that there were approximately three times as many seats of this type for sale as autos of same make and year. When it is considered that not all of the models sold are equipped with the luxury seats, the ratio approaches ten to one, rather convincing evidence that stolen goods are getting on the 'legitimate' market.

At present, the licensed auto wreckers are required to obtain a bill of sale for the items, but they are not required to check the identity of the seller. Since the seats may go through two or three wreckers before reaching the wrecker who specializes in this type of equipment, it becomes impossible to trace the original source.

After some consideration and discussion, the following possible solution was presented to several knowledgeable law enforcement officials.

1. Require that on all automobile parts sales by a private party of over \$100.00 the seller present a driver's licence or similar identification at time of sale and that this be listed on the bill of sale and any transfer of bills of sale.
2. If there exists any serial numbers that they be listed on the bill of sale.
3. The licence (registration) of the vehicle from which equipment was removed to be shown on the bill of sale. Seller must present proof of ownership (i.e. presentation of registration certificate). At this time the buyer would be

required to ascertain face validity by comparing type of equipment to description of auto on the registration certificate.

4. Buyer of equipment who ultimately installed equipment would forward copy of bill of sale to Department of Motor Vehicles.
5. Periodically, tests could be run using batch processing of the relevant information to determine:
 - (a) If the equipment could have come from auto (run against registration file).
 - (b) If the same equipment came out of a given auto more than once.
 - (c) Comparison of auto demolition records and equipment sales.
 - (d) Analysis of original 'legitimate' buyers.

Most of the officials felt, based upon experience with pawnbrokers, that the above methods would probably have a considerable deterrent effect if they could be implemented.

Until the researchers are able to adequately understand the real problems in trying to assure public safety, and are able to suggest more effective alternative means which are focused on maximizing the safety of the inhabitants of the urban environment, any information system would most probably rely on the user requirements approach. However, the steps necessary for the implementation of the tactical control system suggested in the previous section on crime prevention would allow the team to view the system from a resources and requirements outlook. By approaching the design of an information system a derivative function of a tactical control system, it would be practically assured that the informational requirements of the operational units would receive primary consideration. The ability of electronic data processing equipment to rapidly compile large quantities of data should be adequate to meet administrative, supervisory, and statutory requirements for information.

Conclusion

It would appear that the application of systems analysis and similar advanced management techniques can make a real contribution to the solution of many of the problems of management of the urban system. However, a re-evaluation of the objectives of the urban system's functions can be

⁹ The need for registration certificates for the sale of complete autos and engines makes this type of theft less desirable with the existing means available to check the certificates' validity.

of value in clarifying the inter-relationships in what is a highly complex system.¹⁰

I have assumed that the objective of the urban system should be to provide its inhabitants with the best possible social environment, given the resource constraints of the urban system. This objective implies that the objective of the security function will be to maximize the safety of the individual and his property from harm from others through criminal or non-criminal behaviour, while attempting to minimize the interference with members of the public as they attempt to attain their own goals.¹¹ I feel that the above objective will lead to a different set of methods for the security function than will the generally espoused objective of law enforcement, i.e. the control of crime.

When one begins to apply very powerful technology to problems, objectives that appear to have minor differences in emphasis may provide rather divergent environmental conditions. The tactical control system which has an emphasis on the prevention of crime, rather than the apprehension of criminals, attempts to provide an environment wherein the risks of criminal activity become so large that even the professional criminal is unable to find favourable alternatives in criminal activities.

However, systems analysis in itself cannot provide the mechanisms needed to accomplish the security function's objective. There is a need for the application of both management and engineering technology to these problems. It has taken an exceptionally expensive space race, in which billions have been spent, to find out about a world very few of us will enter in our lifetime, for Americans to develop an interest in improving the world they inhabit daily. Perhaps as G. Allen Smith¹² noted in discussion with the author, NASA's greatest contribution may not be in its space achievements, but in demonstrating to Americans they have both the resources and the ability to solve extremely complex problems in spheres such as urban management.

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¹⁰ The inclusion of politics and the many human factors in the operation of the urban system provides a far greater degree of indeterminacy than could be found in physical systems of a much higher order.

¹¹ We must balance the value of any increase in safety and the value of the accompanying reduction of individual freedom of action.

¹² NASA's Ames Laboratories, Moffett Field, California.

