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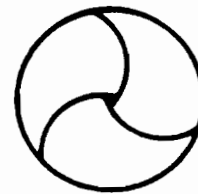
Publication Date

1980-08-01

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Vol. IV: Structure, Competition, and Reliability in Planning and Operations

Jonathan B. Bendor



August 1980
Final Report

Institute of Urban and Regional Development
University of California, Berkeley

Prepared for

U.S. DEPARTMENT OF TRANSPORTATION
Urban Mass Transportation Administration
Washington D.C. 20590

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Stanford University

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The study was supported by the
U.S. Department of Transportation,
Urban Mass Transportation Administration,
Grant No. CA-11-0001.

Additional support was provided
by the University of California's
Institute of Urban and Regional Development.

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ABSTRACT

In contrast to the private sector, public services in the United States are organized monopolistically. The structure of public sector monopoly has been bolstered by the conventional wisdom in public administration, which has traditionally maintained that functional duplication is wasteful. This position has recently been challenged by a small group of political scientists and economists who suggest that a redundant organizational structure can make the execution of a given program more reliable and make the design of new programs more innovative.

This study examines urban transit planning and operations, subjecting these two opposing perspectives to empirical scrutiny. It was hypothesized that, during transit planning, redundant planning would increase the intensity of search for transit alternatives, and that during operations, redundant modes would increase service reliability in the face of a variety of disturbances. These propositions were examined in three case studies: (1) a study of interorganizational, redundant transit operations in the San Francisco Bay Area; (2) a study of modally integrated, monopolistic transit operations in Washington, D.C.; and (3) a study of interorganizational competitive transit planning in Minneapolis-St. Paul. The findings follow below.

The redundant transit system composed of overlapping operators proved more reliable than either of its parts. The bus agency was plagued by two long strikes; the rapid rail district, by mechanical difficulties and labor disputes. Because the two organizations are (nearly) completely independent, failures in one agency did not impair the other's functioning.

The nonredundant, monopolistic system in Washington, D.C. performed more reliably than expected, largely because of the system's conservative technical design. However, there were internal management difficulties associated with efforts at modal integration. The old and ailing bus system received insufficient managerial support and attention for several years, as top management apparently perceived the organizational mission to be the completion of the rail system. This orientation resulted in a neglect of transit patrons who rode buses. There was no clear evidence that organizational merger per se saved money, although eliminating bus routes paralleling rail has saved several million dollars annually.

In the case of competitive planning, in Minneapolis-St. Paul rivalry between two regional agencies presenting alternative transit designs focused public attention on fundamental choices and gave the state Legislature time for reflection and studied consideration of the issues. The competition also reduced the danger that the conclusion of system planning would be predetermined from the beginning of the process. The arguments between advocates made planning genuinely iterative; the final system design had not been envisaged by any participant. However, the competition did have certain negative effects, most importantly an excessive personalizing of transit planning. Institutionalizing

rules of due process in competitive planning would decrease this problem.

In sum, it seems that far more subjective confidence has been placed in the conventional wisdom of nonredundant, monopolistic public organizations than evidence warrants. The study concludes by extrapolating the findings from urban transit to evaluate the general desirability and feasibility of redundancy in government.

ACKNOWLEDGEMENTS

One of the most pleasant aspects of completing this study is that I can finally acknowledge in print the help I received from numerous individuals and organizations. First thanks go to Martin Landau for providing theoretical inspiration. I also benefitted by receiving many pointed comments from Melvin Webber and Aaron Wildavsky. I am especially indebted to all three for having urged me to resist the temptation to write a scholarly tome. They wanted policy-relevant ideas. If I have failed in this, the fault is mine.

A most important acknowledgement goes to the scores of transit officials and observers who talked, often with great frankness, about problems of organization and decision-making. I am especially indebted to the interviewees from Minneapolis-St. Paul for their candor and their generosity.

I am particularly grateful to Thomas Hammond and Serge Taylor for their insightful comments on an entire draft of the manuscript. I also thank Suchitra Bhakdi, Mark Brucker, Alan Egan, David Jones, Jack Knott, William Niskanen, Steve Rosenstone, Stuart Ross, and Russ Stout for their contributions of comments on selected chapters. I enjoyed stimulating conversations on related topics with Sy Adler, Don Chisholm, Jane Fraser, Mark Mandeles, and Phil Viton.

I was fortunate to be on the job market while writing the thesis. Interviews gave me a chance to give presentations, and I received much interesting criticism. This was an unexpected benefit of looking for a job.

Colleagues provide wisdom; organizations provide money. For financial support I thank the Urban Mass Transit Administration, U.S. Department of Transportation, for giving a grant to the Institute of Urban and Regional Development, University of California, Berkeley. The grant funded a larger study of which this work is a part.

The task of typing fell principally upon Cynthia Lehner and Candy Wynne of the Institute of Urban and Regional Development. I thank them for a most careful job. I also thank Grace Katagiri for patiently shepherding the manuscript to completion.

My family had the sensitivity to forego asking how the study was progressing yet listened intelligently when I wanted to talk about it. For this and much more, my heartfelt thanks.

Though we were often 3,000 miles apart, Linda Rothenberg was there when I needed her. No more need be said.

Despite the efforts of a redundant network of error-detecting teachers and peers, mistakes undoubtedly still lurk in this work. Because the theory of redundancy is a technical theory of reliability rather than a moral theory of culpability, I alone am responsible for all errors of theory and fact.

CHAPTER ONE

Introduction

For Max Weber, bureaucracy, despite certain risks, embodied rational choice. More recently social scientists have regarded bureaucracy with a more jaundiced eye. Indeed, some of the most interesting work in organization theory in the last thirty years has explored the limitations on rational choice (Merton, 1940; Simon, 1947; Cyert and March, 1963). Simon, focusing upon the individual decision-maker, framed the problem in terms of how an organization, composed of intentionally rational but fallible persons, could function. His early work explicitly juxtaposed organizational and individual levels of analysis. This contrast caught the attention of the political philosopher Sheldon Wolin, who feared that Simon's focus on "irrational man¹ and rational organization" (1960, p. 380) would eventually represent "the organization as the epitome of rationality, as being that which man is not." By so doing "organization theory has succeeded in creating a standard of non-human excellence." But Wolin failed to observe that, in fact, the Carnegie school had not systematically pursued the intriguing question of whether organizations can offset, in Simon's words, the "limits of humans as mechanisms for computation and choice."

Aside from Simon's early work in the late forties and early fifties, the influential Carnegie tradition seems to have focused more on how individual limits translate into organizational limits than on how the latter could compensate for the former.² Starting in the late fifties and culminating in The Behavioral Theory of the Firm (1963), Cyert and March developed a theory explaining why organizations could not be as comprehensively rational as classical economic theories implied. And their theory of limited organizational rationality was based largely upon a theory of limited individual rationality.

When we reach second-generation interpreters (e.g., Allison, 1971), we see that Wolin has no need for concern. The question posed by Simon nearly thirty years before--how do organizations function if administrative man is more fallible than economic man--is lost to view. The organization is as limited as the individual (see particularly Allison's Model Two);³ there are no compensating features. What began as an interesting tension ended as a commonplace observation: systems composed of imperfect parts are equally imperfect.⁴

This focus on organizational difficulties that are merely an enlargement of individual constraints is not so much inaccurate as incomplete. Concerning organizational design and structural possibility, is it necessarily true that organizations must be as unreliable as their parts? Martin Landau, in his 1969 essay on "Redundancy and Rationality," gave a surprising answer--no. Following John von Neumann's pioneering work in reliability theory, Landau extended the idea of redundant (functionally equivalent) components to design organizations more reliable than their parts. Landau proposed that, contrary to historical

public administration strictures against duplication and overlap, a correct arrangement of independent (see below p. 25) and functionally equivalent channels of communication, decision and action can provide a degree of reliability that a single channel could rarely attain. Consider the following analogy. Suppose an automobile has dual braking circuits, each circuit can stop the car, and the circuits operate independently so that if one malfunctions it does not impair the other. If the probability of either one failing is 1/10, the probability of both failing simultaneously is $(1/10)^2$, or 1/100. Add a third independent circuit and the probability of catastrophic failure (no brakes at all) drops to $(1/10)^3$, or 1/1000.

The example could be extended, but the point should be clear: a system's reliability is not necessarily limited by its components' fallibility. Hence though the strategy of redundancy is fully consistent with organization theory's emphasis on the proposition that "every actor is a risky agent" (Landau, 1969), it goes beyond that idea by abandoning the easy equivalence between individual and organizational effectiveness. By doing so the strategy takes us full circle, back to Simon's early, unexplored tension on the rationalities of the two levels.⁵

One need not stay at the individual and organizational levels, but can extend the notion of redundancy to multi-organizational systems. If it is true, as much empirical work indicates, that agencies are themselves risky actors, prone to develop rigid perceptions and routines maladapted to changing task environments, then such an extension is plausible, though as yet empirically unwarranted. The question of multi-organizational redundancies will be discussed in more detail below.

Different Kinds of Redundancies and their Effects

The general theory of redundancy deemphasizes the adaptability and reliability of single channels, whether individuals or organizations. It stresses instead the advantages of multiple channels even if each channel individually is unreliable. This implies an emphasis on error-absorption, the ability to function despite the presence of a failed channel, rather than on error-correction. Engineers call systems that operate despite malfunctions failure-tolerant. Such systems are not "failsafe" but they do "failsoft." We will refer to this as the backup effect of redundancy, which is produced by a sheer availability of (independent) alternatives.

Competitive Redundancies

The classical theory of redundancy, deriving from the study of insensate systems, does not analyze strategic interactions between redundant components. Indeed, component interaction is mainly a problem for redundancy theory, as it indicates a disruption of the functional independence essential to the backup effect. If the redundant components are interdependent, then one channel's failure may disrupt a duplicate.

It is reasonable to assume, however, that if public agencies overlap by providing the same service or working on similar plans, they probably will be aware of each other's existence. Further, there may be conflict over "turf." Far from being passive, independent suppliers, the agencies will perceive one another as rivals for an exclusive jurisdiction.

Interdependence, a problem for redundancy theory, can be seen

as an opportunity, particularly if we look through the lenses of economics and see interdependence as rivalry. The concepts of competition and redundancy (which developed independently) conceptually overlap on the backup effect. Like redundancy, competition always connotes alternatives. Competition, however, connotes an additional property of rivalry between alternative suppliers for the support of a service's users. Though the backup effect of general redundancies does not require that suppliers of substitute services know about each other, much less conflict,⁶ the concept of competitive redundancies connotes a conscious striving of opponents to outperform one another.⁷ Hypothetically, rivalry stimulates suppliers' performance, either preventing decline or stimulating recovery. Competition thus connotes more active error-correction than does redundancy.

The analogy between private firms competing for profits and public agencies competing for budgets has been explored by Ostrom, Tiebout, and Warren (1961) in their classic analysis of polycentric⁸ organization in metropolitan areas, and by Niskanen (1971, 1975) in his theory of competitive and monopolistic supply by public agencies. Before these works, the field of public administration was terra incognita to competitive theory.

Ostrom et al., taking as their empirical base the Lakewood Plan in Southern California, examined cities that by contracting for services, expanded the sources of supply open to them. Lakewood cities contracted with Los Angeles County, private organizations, neighboring cities, and sometimes provided the service themselves. This created a quasi-market which, the authors asserted, had the conventional market virtues of inducing flexibility and responsiveness to client demand. They drew no

distinction between the behavior of public and private suppliers, so presumably the mechanism of competition, heightened supplier responsiveness owing to threatened or actual loss of customers, applied to all vendors. They further noted that the chief administrative officer of Lakewood cities behaves like a buyer in a large corporation, bargaining for local consumer preferences instead of being sensitive to production considerations as often happens in American cities.⁹ In a followup study, Warren added that the buyer cities' representatives gradually became experts in purchasing services, diminishing information asymmetries which plague consumers.¹⁰

Ostrom et al.'s main innovation was not exploring the process or effects of competition, which were described conventionally, but transferring them to the context of metropolitan government. They pointed out that, by distinguishing production from provision of service, it is possible to introduce competition even though the services ultimately provided are public, i.e., not packageable for individual consumption.

Niskanen has developed a more formal theory of competitive and monopolistic public bureaucracy. Following profit-maximizing analysis, his 1971 model assumes that bureaucrats attempt to maximize budgets. Under this and other¹¹ assumptions, Niskanen shows that a monopolistic bureau is not more technically efficient (where technical efficiency is defined as producing at minimum cost) than competitive bureaus,¹² disputing the conventional wisdom that overlapping jurisdictions are wasteful. Indeed, since competing bureaus would give appropriations committees information about sound and unsound programs, thereby eliminating the monopoly of information possessed by a single bureau,

the total budget of the competing bureaus would be less¹³ than a single bureau's (1971, p. 160). And although competition would not reduce allocative inefficiency--oversupply of output¹⁴--competitive bureaus do no worse on this criterion than monopolistic ones.

In 1975 Niskanen modified his model by relaxing some of the less realistic assumptions, such as the postulate of passive sponsoring committees, and by changing the bureaucrat's goal to discretionary budget¹⁵ maximization. The major result for monopoly bureaus is that technical inefficiency plagues them more, and allocative inefficiency less, than the 1971 model predicts.¹⁶ Since competition cannot improve the latter condition but can the former, the modifications increase the applicability of competition.¹⁷ Bureaucratic competition reduces some negative impacts of the new theory's managerial discretion component (i.e., bureaucrats using discretionary budget for perquisites instead of output). Competition gives legislative committees more accurate estimates of true minimum cost budgets, thereby reducing the discretionary budget available to bureaucrats.

It is significant that the results of the only sustained, formal examination of competition and monopoly in government are unfavorable to monopoly--even in terms of cost. I need hardly mention that a key argument for reducing organizational duplication is the expected cost saving of such a move.

The Organizational Context of Redundancy

Both Ostrom et al.'s and Niskanen's works assume that competing units are separate organizations, whereas in Landau's 1969 essay the organizational locus of redundancy is less stressed. I hypothesize that

the more competitive the redundancy, the more likely it is embodied in independent organizations. In competitive redundancies, the rivals must be differentially rewarded for their achievements, as well as having discretion over which programs to pursue. The combination of these elements, discretion over major decisions and differential rewards for results, would create at least a de facto organizational boundary. In noncompetitive redundancies, where units functionally overlap but do not fight over scarce resources, it is less necessary that redundancy be embedded in separate organizations.¹⁸ A single organization could easily have, for example, overlapping communication channels that are not rivals in the competitive sense. Indeed, it is difficult to imagine an organization that would not have channel redundancy, once one takes into account informal networks.

There are trade-offs between multiorganizational and single organization redundancies. Since organizationally separated redundancies are by definition less likely to be joined together than are redundancies in a single organization, multiple organizations are more likely to fail independently, a crucial property of effective redundancy. Furthermore, because separate organizations are more likely to be rivals, they will have incentives to expend greater effort. On the other hand, redundant units in the same organization can be expected to aid each other more than would redundant units in separate agencies. Whether the net advantage rests with multiorganizational or single organization redundancies depends upon the relative magnitudes of these opposing effects.¹⁹

Which type of redundancy is adaptive depends upon more than the organizational form. Certain features of an agency's task environment or decisional context also have an impact. I now turn to this question.

Redundancy in Different Decisional Contexts

The theory of redundancy originated primarily in reliability engineering. It was intended for well-structured problems,²⁰ in which choice criteria are specified, the probability and criticality of failure are known or well estimated, and, most importantly, a solution already exists. What is desired is reliable deployment of the solution at appropriate times (recall the brake example). Here redundancy enhances a system's short-term reliability. In these circumstances one can legitimately compute optimal amounts of redundancy. This is an operations research problem, and the concepts of efficiency and redundancy are fully compatible. Highly specialized redundancies, routinized to the point of being "frozen" into machinery, are sensible here.

Such situations, however, are usually limited to an organization's technical core, to use J. D. Thompson's phrase. Outside this zone, problems are less well-structured. The difference between well- and ill-structured situations can be partly captured by a matrix of two dimensions: a solution is either known or unknown, and decision-makers either know or do not know where the system will be disrupted.

(fig. 1) Where problem will occur:

	known	not known	
	1	2	known solution
	3	4	not known

In cell one we have the previously described case of simple duplication. It is known, e.g., that a brake can fail and that such a failure is critical. It is also known in advance that the solution to the problem is another brake. In cell two we know the solution, but not where the disturbance will occur. Here we can still use highly specialized redundancies, but because we must allocate them flexibly, the redundancies are latent rather than active. Latent redundancies remain uncommitted until it is known where a breakdown has occurred.

In cell three we again know what problem is crucial; e.g., a missile component is needed and separate R & D teams are working on it. Since the solution is unknown, the teams should work on different designs. The redundancies of this cell vastly increase a system's flexibility of response over cell one.

Cell four situations require the most flexibility because both where a problem will strike and what the solution should be are unknown. General problem solvers, such as unassigned troubleshooters within an agency or incompletely specialized agencies able to take over parts of others' functions, make sense here. There is a price for the highly flexible redundancies of cell four. It is unlikely that they are as efficient as the specialized redundancies of cell one, because general problem solvers must incur the costs of learning by doing--costs avoided by actors already specialized to the task at hand.

I wish to examine in more detail cell three because it is one of the more significant contexts for organizational redundancies, as contrasted with the largely hardware redundancies of cells one and two. Cell three has received much attention from the R & D literature. A development project is a prototypical cell-three situation, and some of

the earliest analyses of the potential for redundancy in government was done by Burton Klein and his RAND colleagues in their studies of Air Force development problems.

Based upon their examination of how frequently early development choices turn out badly, in terms of poorly predicting final cost and performance, the RAND group suggested (Klein, 1959, 1962; Nelson, 1961) that particularly difficult and important development problems should be contracted out to competing teams. These rivals would work on parallel but different solutions, increasing the chance of discovering a satisfactory design.²¹ The point is to avoid premature programming--being locked in, at an early stage, to an alternative that turns out flawed. Instead of gambling on accurately predicting, *ex ante*, the difficulties and opportunities of the options, several are pursued simultaneously. This is costly, but Klein and his colleagues maintained it is cheaper than being committed to an erroneous bet.

Since parallel paths duplicate effort, which is usually perceived as costly, how could redundant projects cost less than unitary ones? The explanation depends on two factors. First, early selections in development, as in "pure" single-path strategy, are risky concerning system cost as well as performance. Unexpected bugs in the chosen alternative delays completion and increases cost. And the earlier it is selected, the higher the uncertainty. Second, development projects cost least early, and costs increase steadily up to the manufacturing stage. Therefore, if a project manager hedges his bets early by advancing parallel approaches, he does so at relatively low expense. Since predicting system or subsystem cost is most risky early, it is likely that a single-path selection would have been an error; yet the

cost of preventing such an error early in the process is not great. Duplication, though expensive, is not necessarily more expensive than the alternative.

Whenever a decision situation combines increasing cost and decreasing uncertainty over time, then it is a candidate for a "pruning" redundancy strategy: instituting at the beginning parallel paths which are pruned²² as the uncertainties diminish and as the costs of continuing the duplications mount.²³

But why use simultaneous, parallel approaches rather than a single-channel, adaptive strategy, i.e., a single team sequentially trying different solutions? There are two answers. (1) If time is critical, the sequential strategy is probably inferior. For example, in the Manhattan project several teams worked simultaneously on key problems; since we were worried the Germans might build the bomb before we did, we could not afford the luxury of a sequential strategy. (2) A single team may become committed, either because of sunk costs or inability to admit error, to an inferior solution. In turn the user is saddled with an inferior product. Through either process, a smoothly adapting, error-correcting strategy breaks down.

In summary, redundancy can assume several forms: competitive or noncompetitive, specialized or generalized, latent or active. The different types are appropriate for different circumstances, and hypothetically have somewhat different functions, ranging from the passive backup effect of noncompetitive redundancies to the performance stimulating effect of competitive redundancies.

Regardless of which variant is considered, the theory of redundancy has had a brief history in American public administration.

Indeed, until the sixties and seventies, when Ostrom, Landau, and Niskanen challenged conventional wisdom, it had been virtually axiomatic in the field that programmatic duplication and jurisdictional overlap are at best wasteful and at worst actively harmful. I now turn to an examination of the traditional perspective.

The Rationale for Nonredundant Structures

At least three major reasons have been presented in the case against redundancy. (1) The economy argument is probably best known. At its most basic, the position is that maintaining several agencies to do a job that one can do is wasteful. If performance is assumed to be non-problematic, it is hard to take exception with the point. The question is, of course, what is the probability that a given task will in fact be performed, and what are the consequences if it is not?

A more subtle version of the economy-efficiency line is the suggestion that merging duplicate activities inside one organization produces economies-of-scale. This argument is particularly persuasive when economies-of-scale pertain to physical facilities, as these are more easily measured than administrative scale economies.²⁴ Economists have noted a tendency to obscure the difference which confuses the optimal size of an industrial plant with the optimal size of a firm. Political scientists should avoid analogous confusions in the public sector. Blurring the distinction could result in recommending mergers at the wrong organizational level. The obvious physical scale-economies result from merger at fairly low levels, but mergers are often aimed at higher levels, where the argument must rest on less easily measured administrative economies.²⁵ The political symbolism of reorganization

is probably more important here than substantive considerations.

(2) Gaps and overlaps. The economic perspective is held more often by organizational outsiders than insiders. It is a budget-cutting move. Insiders are unlikely to wish to cut the budget, but they may be attuned to another difficulty that redundancy can create, programmatic gaps. Given a fixed budget, more resources for one problem imply less for another. Overlaps, therefore, automatically imply problem-solving gaps elsewhere.²⁶ One can call this the internal opportunity cost of redundancy.

(3) Pinpointing responsibility. Organizations allocate blame as well as solve problems, and overlapping jurisdictions may make it more difficult to assign blame (Wallace, 1941). A nonredundant structure reduces this uncertainty.²⁷ A corollary is that clear lines of responsibility, from elected officials down through bureaucrats, stimulate performance because it would be easy to detect who was at fault for failure.

Historical Origins

Notwithstanding the validity of some of the above arguments (see, e.g., footnote 26 for an undeniable example of redundancy's opportunity cost), our norms against bureaucratic competition are still puzzling when one places them in a comparative institutional context. We tend to favor competitive markets and competitive political parties. An adversary process is an integral part of our legal institutions. Our civil service is nominally competitive in terms of hiring and promotion. Our constitutional arrangement of checks and balances operates on a competitive principle.²⁸ Yet we condemn competition in our public

bureaucracies in a one-sided fashion.

How can we explain this crazyquilt pattern of norms? It is possible they are based on clear evidence of competition and redundancy's different effects²⁹ in different institutions. There is, however, no such evidence pertaining to bureaucracies. The unmitigated dysfunctionality of bureaucratic redundancy is more or less an untested axiom, sometimes explicitly stated (Coker, 1922), but rarely doubted. The instrumental explanation can be discarded as an explanation for the norms.

I suggest that to unravel the puzzle we should instead investigate the history of public administration doctrine.³⁰ I propose that our preference for competitive inter-organizational arrangements in both public and private spheres dates back to the political economists of the 1700s, whereas public administration strictures against redundancy represent an entirely different intellectual tradition, originating with Wilson and continuing through Willoughby and White. The political economists focused upon competing independent firms or quasi-independent, separate political institutions. The question of how to manage the internal affairs of large-scale organizations did not arise then, for a good and sufficient reason--such organizations did not exist in the 1700s. Early public administration, on the other hand, was contemporaneous with the emergence of a powerful organizational form, the corporate hierarchy.³¹ The corporations' thrust then was consolidation, horizontally to reduce competition and vertically to coordinate specialized, interdependent processes. And just as the "visible hand" of corporations would supersede the vagaries of the market, so would government based on a corporate model overcome the defects of chaotic organization.³²

The corporate analogy became more explicit as public administration evolved. As far back as Woodrow Wilson, administration was considered a species of business. But Wilson, writing in 1887 before the rise of the great corporate hierarchies, could only sketch the desired administrative structure. By Willoughby's time, the corporate form had crystallized. His analogies between government and business were accordingly more detailed. He deliberately set up correspondences between existing corporate and prescribed governmental structure. Legislatures are equated with boards of directors, chief executives become general managers, and departments become unifunctional divisions (1927, chapters 2, 3, 5).³³ The correspondence is so clear to Willoughby that he measured governments by their approximation to the corporate ideal:³⁴

The government offering the closest approximation to the board of directors-general manager system of private corporations is probably that of Switzerland . . . The actual working relations between the legislature and its administrative agents are almost identical with those obtaining in a private corporation . . . It represents a system of administration towards which American practice is tending, notwithstanding the obstacles that stand in the way in the form of our doctrine of separation of powers. (*ibid.*, pp. 50-51)

Once the comparison is made to corporations, the internal structure of government falls quickly into place; "there is no question" that an integrated structure with unifunctional departments is superior. Eliminating internal competition was an easy corollary of the corporate model. Corporations had expanded partly to reduce competition, and Willoughby was long before the time when corporations used competing divisions internally. Not only did the one-to-one matching of functions to departments automatically entail internal monopolies, Willoughby sought this outcome intentionally:

. . . a proper grouping of operating services departmentally furnishes the only means by which conflicts of jurisdiction, overlapping of functions, and duplications of organization, plant and activities may be avoided. (ibid., p. 84)

The corporate model's implications were reinforced by the then popular machine metaphor.³⁵ Willoughby conceived administration as "a single integrated mechanism" (p. 81). Consider the following syllogism. The measure of a machine's performance is efficiency; friction constitutes inefficiency; organizational conflict equals, under the machine metaphor, friction; therefore, conflict is inefficient; and decreasing conflict by diminishing its causes such as overlapping jurisdictions will increase efficiency. Q.E.D.

Willoughby's explicitness in advocating eliminating redundancy should not lead us to infer he was first to raise the issue. Congressional economy and efficiency committees preceded academic public administration theorists by thirty years, advocating cutting waste and shrinking government (Arnold, 1976). Although the committees' goals were to reduce government's size and expenses, the academics' goals were to strengthen the executive branch; "the root purpose of executive reorganization has remained the increase of presidential power over administration." (ibid., p. 26.) The difference in approach was signalled by a growing split between the concepts of economy and efficiency. Originally they were synonyms, referring to streamlined, simplified government (ibid., p. 8). By Taft's Commission on Economy and Efficiency in 1911, however, scholars such as Frederick Cleveland distinguished economy from efficiency. The latter connoted performance, not merely saving money. Adequate performance was in turn related to a strong chief executive, the president. Willoughby, who served with

Cleveland on the Taft Commission, testified that

The goal of economy was minor compared to the necessity for government to be able to plan its future expenditures and competently recommend policy to Congress. (*ibid.*, p. 15)

Thus while congressional economizers wanted to eliminate wasteful programs, executive-oriented advocates urged consolidating³⁶ like programs into single departments to augment managerial efficacy.³⁷

Both perspectives, however, pointed to the same outcome: increased departmental monopoly.³⁸ It is curious that in sixty years of reorganizations, the tendency to reduce bureaucratic redundancy remained constant despite changes in justification.

In the decade after Willoughby, both machine and corporate metaphors ebbed in use. Already political scientists were casting a skeptical eye toward the concept of efficiency; it was altogether too ambiguous (Dimock, 1936, p. 120). But though the basic metaphors were receding, they left their imprint on the structural discussion of the thirties. The dominant criterion remained organizing by major purpose, although White, among others, noted that the criterion was vague, that inevitably there were marginal cases where several agencies could validly claim jurisdiction (1939, p. 87, 106; see also MacMahon, p. 261; Herring, p. 334). Except for Wallace (1941), no scholar of that day challenged the basic wisdom of establishing, through unifunctional organization, departmental monopolies.³⁹ Implementing the principle was perceived the major problem: what constitutes a major function? How does one handle a hierarchy of functions? Should there be departments of Health, Labor, Education and Welfare, or one huge Department of Human Resources? The marginal cases that White and others noted were

regarded as practical problems in using the principle, not as opportunities for stimulating bureaucratic competition.

Gulick's elaboration of other organizing criteria, process, place, and clientele in addition to purpose (1937), set the terms of debate on structure for nearly two decades. The debate revolved around the ambiguity and incompatibility of the criteria (Wallace, 1941; Simon, 1947). By the late fifties, agnosticism concerning organizational form had set in. The arguments had gone little beyond Wallace's and Simon's criticisms of Gulick's criteria in the forties. Millett, still advocating grouping by major purpose, conceded "it is not easy to decide what shall be regarded as a common purpose," nor was it easy to tell which criterion was superior (1959, p. 138). In any case, public administration scholars were less interested in structural questions by this time, as studies of decision-making came increasingly to the fore.

From this study's perspective, the debate on Gulick's scheme was significant because it turned the field's attention away from examining the monopolistic implications of organizing by function. Scholars were caught up arguing whether organizing by purpose could be distinguished from organizing by process, or which was more efficient in what situations. The alternative of a redundant system, in which all programs serving the same function were not consolidated inside one monopolistic department, was neglected. Thus the corollary to Willoughby's business metaphor, that government's internal organization should be as noncompetitive as corporations' internal organizations, remained largely unexamined for three decades after him.

I should not imply that social scientists were entirely silent about this matter before Klein, Ostrom, Landau, and Niskanen reopened

it. As early as 1954 Norton Long, using a political party metaphor, suggested that the conventional, monopolistic bureaucratic structure contained hidden dangers:

We would all recognize the deficiency of a one-party legislature, yet many of us would applaud, and are applauding, a one-party top level bureaucracy. It may seem a forcing of the analogy to suggest that a loyal opposition in the upper levels of the bureaucracy could serve a function well nigh as socially useful as that performed by the loyal opposition in Parliament. We have only begun to think of how best to staff and organize administration if a major part of its job is to propose policy alternatives--alternatives that have run the gauntlet of facts, analysis, and competing social values built into the administrative process. (p. 92)

This analysis, sketchy as it is, is striking because for the first time in many years a student of public administration based organizational design on an inter-organizational, political metaphor. It hearkens back to the federal design⁴⁰ (with a new emphasis on factual checks), not to the classical public administration of Cleveland or Willoughby with their corporate analogies. Unfortunately, Long's suggested reorientation seemed to have enjoyed only minimal reception.

More influential in stimulating scholars to rethink the matter was the empirical work of Arthur Schlesinger on Franklin Roosevelt's bureaucratic strategies and Samuel Huntington's study of armed services competition. In particular Schlesinger's refreshing and oft-quoted description of Roosevelt's use of overlapping assignments and multiple information channels provided a novel way of looking at redundancy in bureaucracy. By the end of the fifties the unquestioned hegemony of the monopolistic model was ending.

A new theory, however, often creates new problems as well as new insights, and this is not an exception. I will now examine some of these problems.

Problems in the Theory of Organizational Redundancy

The questions I wish to consider fall into three categories. First, there are empirical problems about the organizational formation and decline of redundancy. (1) Under what conditions does redundancy originate in public bureaucracy? If it is true that it is generally not an approved form of governmental organization, we should not take its appearance for granted. (2) Once it appears, how stable is it?

Second, because redundancy theory originated in a remote technical field, there are complications applying it to organization theory. (1) In hardware systems with built-in redundancy, duplicate channels must function independently, otherwise the point of the redundancy is lost. How likely are redundant agencies to be independent? (2) Hardware examples make applying redundancy appear deceptively easy, particularly when a hardware redundancy protects against only one kind of error, e.g., auto brakes not working when they should. What are redundancy's effects in social situations where there are two kinds of interdependent errors, e.g., freeing a guilty man versus punishing an innocent one?

Third, basic normative questions must be faced. In what circumstances is redundancy desirable, and how much is desirable? The traditional view that redundancy is never desirable was an inviting target; in its extreme form it is clearly untenable. The real questions are when and how much?

I will now proceed to a more detailed consideration of these issues.

The Appearance of Redundancy

The appearance of redundancy in the public sector, whether competitive or noncompetitive, cannot be regarded as unproblematic. Agencies, unlike firms, are not free to compete or enter new fields whenever they wish to: their jurisdictions are legally defined. How then does bureaucratic duplication develop?

(1) Although charter legislation typically attempts to differentiate agencies' boundaries, it may be impossible, as public administration scholars have noted with regret, to assign a problem unambiguously to one agency. Consider the example of mine workers' safety. Categorized as a mine-operation problem, it could fall under the jurisdiction of the Bureau of Mines (Interior); categorized as a workers' problem it could fall under the Department of Labor's jurisdiction.⁴¹ It is probably easier for redundancy to develop if it is latent, i.e., if, as in this example, the problem activating the latent overlap arises years after the agencies are established. Because no one anticipates the problem that will highlight the jurisdictional ambiguity, no one bothers attempting to differentiate the organizations' boundaries. It is particularly easy to overlook latent redundancies when agencies are established at different times for initially different purposes.

(2) Non-bureaucrats, such as chief executives, may find it in their interest to instigate competition among subordinates. Franklin Roosevelt's strategy is the best known example. The collective inability of political scientists, however, to detect other cases leads one to believe that intentional creation of redundancy is numerically less important than less dramatic cases such as (1) above.

(3) At agency level, bureaus are free to negotiate division-of-labor agreements guarding against competition. But these treaties do not prepare for every contingency. New technological opportunities can render agreements obsolete or indecisive. For example, in the Armed Services Accord of 1947 was a crude rule of specialization: if a weapon moved on or in water the Navy had jurisdiction; land was reserved for the Army and air for the Air Force. The treaty broke down with the advent of intermediate range ballistic missiles. The Air Force claimed IRBM's on the grounds that the missiles travelled through the air. The Army argued that since the missiles were land launched, it should have jurisdiction. Yet another technical possibility, underwater-launched missiles, enabled the Navy to join the competition by developing the Polaris.

In general, a bureau's encroachment on another's domain is more tentative and gradual than analogous market processes. Branching out rapidly is inhibited by the budgetary process. Because it is more difficult to obtain funds for new programs, agency spokesmen usually stress program continuity. Gradual encroachment is facilitated if agencies' tasks do not fall into natural clusters. If jurisdictions are fine-grained rather than coarse, there are no natural focal points for boundaries; arbitrary boundaries must be set. Division-of-labor treaties may exist in fine-grained cases, but they are unstable. For example, the range of the Army's intratheatre missiles must be less than a certain number of miles, but because range is a continuous variable, incremental encroachment is always possible.

Instability

No organizational arrangement can be both unstable and effective. Though stability is generally a precondition for effectiveness, reformers tend to overlook this property. What factors would make redundancy organizationally unstable?⁴²

Agency-strategic reasons. When redundancy is the competitive version, threatening agencies with loss of budget or authority, the agencies will be motivated to eliminate competition.⁴³ This is generally accomplished by negotiating an interagency treaty (memorandum of understanding) establishing an acceptable degree of specialization. Because bureaucratic competition is rarely considered legitimate, treaties to reduce competition can be negotiated without the added costs of secrecy or the clumsiness of tacit adjustment. In contrast with colluding private firms, public bureaucracies are urged at every turn to cooperate and resolve their differences. For example, the armed services' efforts in 1947 to settle on a nonoverlapping division-of-labor were held openly and with the administration's blessing.

Executive stimulated change. As an uninstitutionalized structure, bureaucratic redundancy is sensitive to changes in executive leadership. An executive with a taste for freewheeling competition may be replaced by one who abhors such chaos. Consolidations may then follow, reducing or eliminating redundancies that had flourished in the previous regime. (Although of course agencies will defend their turf.) Unlike agency-strategic reasons, executive reorganizations may be carried out for general ideological reasons, such as conventional efficiency notions found in campaign rhetoric.

Success. If one organization's solution demonstrates its superiority, other organizations may leave the field, transforming competition into monopoly. For the short-run this may be satisfactory. Indeed, Klein's model prescribes progressively pruning parallel development paths, as information is gained about one solution's superiority. But the short-run gain is likely to become a long-run problem. Changing task environments may render old successes ineffective, yet it may be difficult to reintroduce redundancy.

Clearly redundancy would be a more practical reform if its "death" rate, i.e., its instability, were not so great as to require a correspondingly high "birth" rate. Although we can conjecture about probable causes of birth and death, estimating their rates requires empirical investigation.

The Independence Criterion

It is a well-known rule of reliability engineering that to obtain maximum utility from redundancy, channels must be statistically independent of one another.⁴⁴ Only if independence is attained can we expect geometric increases in reliability for arithmetic increases in components--and costs (Landau, 1969, p. 350). Clearly independence is a key attribute of redundant systems. But what does satisfying this criterion entail?

(fig. 2)

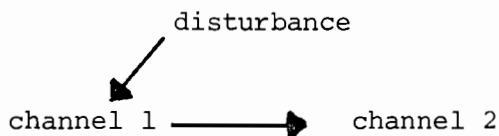
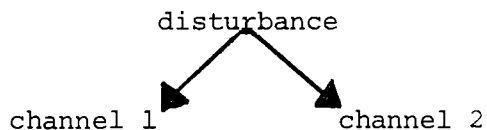


Figure two represents the most obvious violation of the independence criterion. Statistical independence requires more, however, than channels that are not directly connected. There is a second kind of violation. Consider the following example. A new weapon system is being designed and the development of a crucial component is farmed out to three different laboratories. If the probability of any one contractor failing is p , is the probability of all three of them failing p^3 ? It would be if the labs' performances were statistically independent, but how can that be established? One could scrutinize communication patterns, to see whether lab personnel are in contact with each other. One could contract with labs in different firms, on the assumption that belonging to the same organization was ipso facto evidence of interdependence. But the problem is more subtle than that. Suppose that the labs' designs, though different in detail, are all based on the same theory. Imagine further this theory turns out to be either wrong or inapplicable. Initially, at least, all three labs will fail, though not because they communicated with each other or were otherwise directly interdependent. Nonetheless their failures will not be statistically independent (see figure three). It is not enough that the channels not be directly connected; the disturbances must be uncorrelated. Any calculation of reliability added by redundancy that

(fig. 3)



does not take into account this more subtle interdependency will overestimate the reliability gain.⁴⁵

Complete statistical independence among organizational redundancies is unlikely, as there are far too many chances for either violation to occur (communication between channels, similar training producing similar mindsets, and so forth). But independence and reliability are continuous variables, and it should be possible for organizational reliability to improve (though not geometrically) by adding redundancies that are not fully independent. We note, by way of comparison, that even in hardware cases "complete isolation and statistical independence may be unlikely" (Pierce, p. 179-180); nevertheless, redundancy is employed. The structure of redundancy need not be perfect to work. The challenge in applying redundancy theory to bureaucracies is to devise ways of increasing statistical independence even if it cannot be completely attained.

Type One and Type Two Errors

Two hundred years ago David Hume proposed we accept

as a maxim, that, in contriving any system of government, and fixing the several checks and controls of the constitution, every man ought to be supposed to be a knave, and to have no other end, in all his actions, than private interest. (Quoted in Niskanen, 1971, p. 128; original emphasis)

Fearing that knaves may occupy high positions and abuse their authority, the Constitutional architects designed a checks-and-balances system that was more reliable than any of its parts. The system was to be reliable, however, in a specific sense: tyrannical acts were to be guarded against.⁴⁶ In Hume's words, "a constitution is so far good as it provides against maladministration." (Quoted in Wolin, p. 390.) These

are errors of commission.⁴⁷ Systems may also be reliable with respect to errors of omission, ensuring that a desirable event does occur.

Modern engineering redundancy theory distinguishes between a Type One error, failing to stop an undesired event, and a Type Two error, failing to effect a desired one.⁴⁸ Redundancy theory applied to the study of bureaucracies has not yet incorporated this point. Landau did not discuss the question in his 1969 essay, and though he subsequently (1973) discussed redundancy in the context of constitutional design, that a different kind of error is involved is not made explicit.⁴⁹

Are there any interactions between those two kinds of reliability? That is, does guarding against capricious, unwanted action nullify or vitiate the attempt to ensure that desired actions occur? There are several points to consider.

(1) Let us consider a communications system of m parallel units and n units in a series. The m parallel units guard against the type one error of an accurate or desired message from being blocked; the more parallel units, the lower the probability that this will occur. The n series units guard against the type two error of an inaccurate or unwanted message being transmitted. It appears intuitively obvious that it is possible to add enough parallel channels so that the increase of type two errors outweighs the decrease of type one. Hence redundancies can eventually increase total system errors. This supposition is confirmed by Barlow and Proschan's proof in their Mathematical Theory of Reliability (1965, p. 187)--as long as n , the number of series units, is held constant. If n is not fixed, then it can be proven that both types of error can be reduced to arbitrarily small amounts (ibid., p. 184).⁵⁰ These proofs constitute a warning that introducing a particular kind of

redundancy, without regard for the kind of error that is already prevalent, can impair rather than improve organizational reliability.

(2) Of course what counts is not merely an error's frequency, but its frequency multiplied by its damage. When there is organizational consensus on the relative importance of the two types of error, or when it is agreed only one is consequential, one kind of redundancy can be increased to reduce total damage even though the total number of errors is higher than before. For example, because unnecessarily delaying a NASA launch is a less serious error than launching one that would malfunction, the system is deliberately biased against the former by giving five specialists independent authority to halt a firing.

(3) Redundancy becomes a political issue when there is no agreement on the weighting of the error types. For example, people probably agree it is preferable to free a guilty man than jail an innocent one, but probably disagree over the exact tradeoff between the two errors. Redundancy theory alone cannot answer the normative question of which kind of redundancy is satisfactory or optimal in such circumstances; normative decision theory is also needed.

We see, therefore, that the existence of two kinds of errors complicates the theory of redundancy, either because of tradeoffs between the errors or, more politically, because decision-makers do not agree on their relative importance. Both considerations affect the reasonable allocation of redundancy, the last topic of this chapter.

Allocating Redundancy

From its inception, redundancy theory was normative, and the competitive analyses of Ostrom and Niskanen also have prescriptive

implications. The key normative question of designing organizational reliability is, when is redundancy desirable? An uncritical answer--it is always desirable--is likely to prove untenable, as is the traditional answer that it is never desirable.

A fully developed theory would contain equations that simultaneously related the factors determining the functional allocation of redundancy. This is beyond my ability at this time. Instead variables will be presented in pairs; e.g., the more x occurs, the more important is redundancy. Redundancy is desirable:

(1) The higher the probability of failure in a single channel of action, communication or decision.

(2) The more critical (costly) a failure would be.

(3) The less expensive redundancy is.

(4) When one need not worry about interactions between two types of errors, either because only one kind can occur or only one is important. Protecting against only one kind of error simplifies applying redundancy.

(5) When there is a significant chance that a duplicate agency could discover a more effective way to attain the same results that a monopolist agency achieves. The more a monopolistic agency is wedded to its current program, and the more room for significant improvement in the policy area, the more valuable redundancy is.

One difficulty with this analysis is that the criteria will sometimes be inconsistent; e.g., failure may be critical (criterion two) but redundancy expensive (criterion three).⁵¹ There are inevitably grey areas, but the criteria do indicate what classes of situations would be particularly promising candidates. For example, Burton Klein's analysis

of the place of parallel paths in development projects looked promising because criteria one and three, two of the most important, pointed in the same direction concerning the timing of redundant projects, since uncertainty is highest and cost lowest early in development.

The corollary to the fundamental normative question of when redundancy is functional is how much redundancy is warranted under different conditions. Because this is a quantitative variant on the first question, the answer depends on the same parameters. For example, the more costly redundancy is, the fewer are warranted, while the more serious an error would be, the more redundancies are functional. Similarly, if type one and type two errors interact, then the number of redundancies needed to suppress one kind of error is constrained by the tendency to produce the second.

In organizational contexts, unlike reliability engineering, it will often be difficult to estimate quantitative values for the relevant parameters, and it will therefore be difficult to answer the how-much-is-enough question precisely. The point suggests a paradox. One of the most important justifications for redundancy is uncertainty--not knowing whether an actor or component will complete a task. But if uncertainty is great, it will be impossible to specify precisely how much redundancy is required to ameliorate the problems caused by uncertainty in the first place. However, this need not be a counsel of despair. It is possible the theory can provide heuristic rules indicating general direction without specifying precisely optimal amounts. Engineers may design efficient redundancies, but political scientists will usually have to settle for those that suffice.

If the functionality of organizational redundancy is to be more

than a conjecture, empirical study is required. Toward this end I have done three case studies, all in the policy area of urban transit. These will be described in Chapters Three (a case of operational redundancy in the San Francisco Bay Area), Four (a study of planning competition in Minneapolis-St. Paul), and Five (a description of monopolistic operation in Washington, D.C.). Chapter Two covers the research design and relates the general theory of redundancy to the specific context of urban transit planning and operations. Chapter Six compares and analyzes the cases; Chapter Seven concludes with further theoretical implications of organizational redundancy.

FOOTNOTES

¹There was a misunderstanding here: Simon was creating a model of administrative man with limited rationality, not irrationality.

²Simon's brief discussion in Easton (1966) did reflect an awareness of the different kinds of constraints operative at different levels: "Individual human beings are constructed basically as serial information-processing machines. They can attend to only one, or to a few things at a time. This fundamental fact has wide ranging consequences for behavior.

The body politic is composed of a very large number of human beings. Hence it is perfectly capable of operating as a parallel system, carrying on many activities simultaneously" (p. 20).

Substituting "organization" for "body politic" leaves the sense of the quote intact.

³Consider the following juxtaposition of levels of analysis: ". . . Simon and the Carnegie School focus on the bounded character of human capabilities. Firms are physically unable to possess full information, generate all alternatives . . ." (p. 74, emphasis added). And "the physical and psychological limits of man's capacity as alternative generator, information processor, and problem solver constrain the decisionmaking processes of individuals and organizations" (p. 71).

⁴I am indebted to Tom Hammond for discussing this problem with me.

⁵There is some difference. Simon framed his problem in terms of how could a human being of bounded rationality make decisions in an unbounded environment. His answer was that the organization provided

a context for choice by supplying decision premises which structured the situation. He did not address the question of unreliability directly.

⁶In fact, as Samuel Huntington has pointed out in the case of the armed services, creating programmatic duplication (of weapons systems) is one method of diminishing conflict between the services. Guaranteeing redundant channels stability can remove them from the subclass of competitive redundancies because there is no longer conflict over scarce resources.

⁷Conscious rivalry is stressed in competition of the few (oligopoly); in perfect or atomistic competition there need not be mutual awareness (McNulty, 1967).

⁸Ostrom et al. chose not to call their model a pluralist one; the difference is more than terminological. In pluralist models there are few decision-makers who are influential over different policy areas. That property, however, is perfectly consistent with there being, within each policy field, a monopoly bureau which supplies the service. In a polycentric model, on the other hand, competitive supply is a central property. For some reason the structure of bureaucratic supply was not extensively studied during the pluralist-power elite debates.

⁹The incentive for the chief administrator to move in this direction is not explained. Perhaps the localities' competition for residents encourages it.

¹⁰O. E. Williamson (1975) observes that organizations in intermediate goods markets, where exchanges occur between firms, have developed better experience rating than exists in final goods markets, where the exchanges are between organizations and households.

¹¹In the basic 1971 model Niskanen also assumes that:

(1) budgets must at least equal cost of output; (2) bureaus exchange a package of services in return for a lumpsum budget, unlike firms which exchange units of output for a price; and (3) that the appropriations committee will not permit a budget-output package where its marginal valuation for the output is negative, but beyond this constraint plays a relatively passive role.

¹²In the 1971 model, there are two general solutions: a demand-constrained solution, where the marginal value of the bureau's service equalled zero, and a budget-constrained solution, where the amount of service supplied was constrained by the assumption that total costs had to be covered by the budget. In the latter region, even monopoly bureaus are technically efficient (produce at minimum cost). After Niskanen reformulated his model in 1975, this two region solution disappears, and with it disappears the conclusion that monopoly bureaus are efficient under budget-constrained conditions.

¹³This occurs under demand-constrained conditions.

¹⁴Oversupply Niskanen defines as more output than the median voter would prefer.

¹⁵The discretionary budget equals the difference between the budget received by the bureau and the minimum budget necessary to produce the output.

¹⁶Specifically, the mix of technical and allocative inefficiencies depends on the value of a parameter which represents how much of the discretionary budget can be appropriated by the bureaucrat for personal perquisites. When the parameter's value is zero, then the 1971 solution of high allocative inefficiency (oversupply) combined with technical efficiency reappears. The higher the value of the

parameter, the more the bureau is allocatively efficient but technically inefficient.

¹⁷Since Niskanen discussed only monopolistic bureaus in the 1975 model, I am inferring what role competition would play in the revised theory.

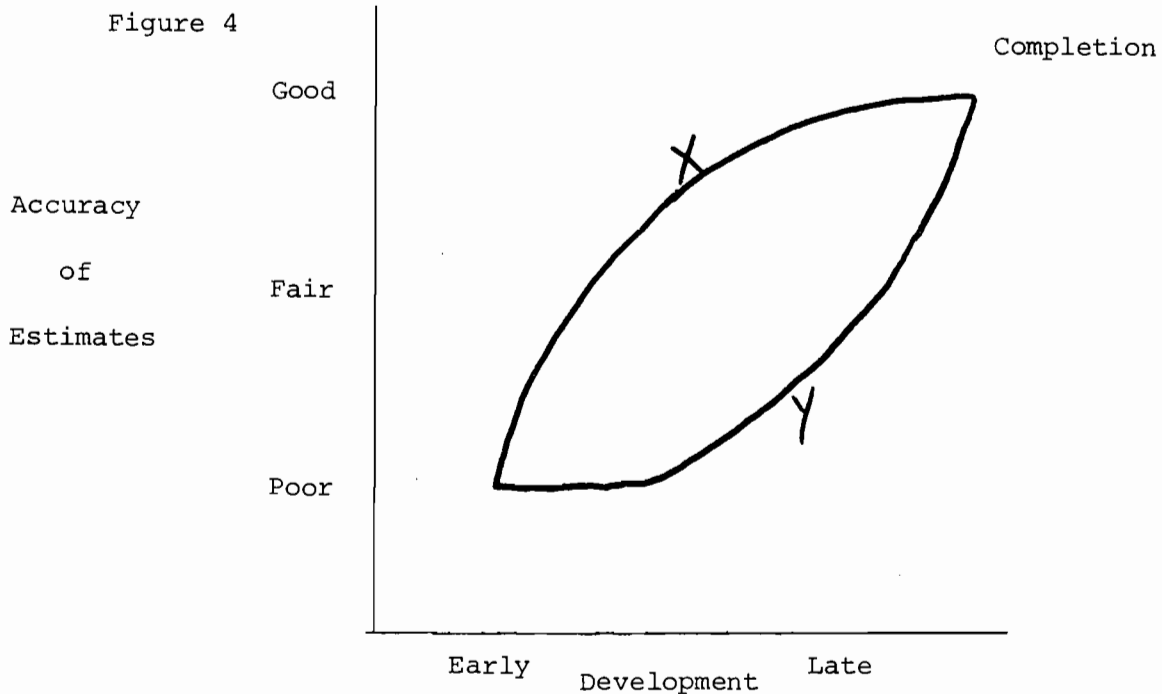
¹⁸Although for certain types of redundancy, such as redundancy of authority, it would seem that independent organizations would be necessary.

¹⁹It is likely that a combination of independence and interdependence will work best, e.g., separate problem solving can occur at one stage, followed by mutual criticism and learning. Felsenthal and Fuchs found that a redundancy design which had this structure was much more reliable than one in which the actors were completely independent (isolated) and never exchanged information (1976, p. 474).

²⁰The competitive models of Niskanen and Ostrom et al. do little to change this orientation because they derive from neoclassical economics, and the main thrust of neoclassical theories of competition has been to study decision-making in well-structured situations.

²¹It is interesting that at almost the same time that the RAND group was elaborating the idea of parallel paths in R&D, sociologists were just beginning to investigate the functions of competition in science. The work took off with Merton's examination of multiple independent discoveries (1961) and quickly led to a critical scrutiny of the common desire to avoid "the wasteful duplication of scientific effort" (reprinted in 1974, p. 378), and an examination of the functions of redundancy.

²²The earlier the various uncertainties can be reduced, the more quickly the parallel paths can be pruned, and the more valuable the strategy. Consider Figure 4: if curve y describes the true state of affairs, information arrives so late that parallel paths are very expensive and a sequential strategy is preferable, assuming that speed is not essential. Although Klein is optimistic that y-type curves are uncommon in development projects, the data he had were not definitive. Improvements in time estimates were roughly linear (1962, p. 490), which, although not a y curve, are a ways from being an x. And Frederic Scherer, commenting on Klein's paper, points out that we should distinguish between different kinds of uncertainty, and hypothesizes that "uncertainties about reliability, operating cost, and utility are usually not reduced substantially until late in the development effort" (ibid., p. 498).



²³Unfortunately there may be politico-organizational difficulties in applying the pruning rules in accord with Klein's (and Nelson, 1961) prescriptions. Many of the RAND case histories on parallel paths involve small project teams under the general supervision of a single service. What happens if the competition is between the large, powerful services? How easy would it be to put the brakes on one of them? Armacost's study of interservice competition throws some light on this question. The Secretary of Defense proved unable to make a decision between the Army's Jupiter and the Air Force's Thor missiles. The political muscle backing both was considerable, and both projects proceeded into the expensive production stage. This probably was a truly wasteful duplication.

²⁴Curiously one of the scale economies attained by larger organizations is a more economical use of physical redundancies: "the big firm needs less proportionate reserve of machinery or of stocks to meet possible emergencies than does the small firm" (Robinson, p. 26).

²⁵In addition to these caveats, Niskanen warns that a monopoly of supply might prevent any economies of scale that are achieved from being passed on to the taxpayers (1971, p. 196).

²⁶An excellent example of this insider perspective was a fight between engineers and scientists on a recent space project. With a weight constraint on the probe, the design engineers and the scientists could not agree on how much redundancy to build into the probe. For the scientists, adding a backup system meant sacrificing scientific experiments. I doubt that the scientists argued that the redundancy was technically ineffective, but rather that it cost too much in terms of experimentation foregone.

²⁷But Gilbert Steiner, arguing against this concentration of responsibility in the anti-poverty fields, rejoins that "while there may be a focusing of responsibility, there is also an exclusive dependence. If the job does not get done, it is easier to decide who should be fired, but this does not much help the potential beneficiary of the nonperformed task" (1971, p. 16).

²⁸In the sense of pitting competing ambitions, and institutions, against one another. The kind of reliability sought in this system differs from that of the others (see p. 27).

²⁹Or different costs. As Dave Leonard pointed out to me, people probably believe that they pay no more for increased competition in an industry whose products they don't use, whereas they do pay more for additional tax-based bureaucracies whose services they do not use.

³⁰Bob Kagan has suggested that there is a legal doctrine at work here as well: norms of fairness mandate that citizens should receive equal treatment by agencies. Equal treatment implies a single set of uniformly applied rules, with clear jurisdictions so that it is obvious which governmental authority makes the rules.

³¹Chandler states that the basic form of the centralized, single product corporation was in place by the start of World War I; hence it was available as an organizational model for our public administration forefathers (1977, p. 455).

³²The prestige of the corporate form in the first third of this century was such that the corporation was an organizational model even to some who were critical of it. Even a (nominal) trustbuster as Teddy Roosevelt saw in it a vision of power; "There is every reason why our executive governmental machinery should be at least as well planned,

economical and efficient as the best machinery of the great business organizations" (in Hays, 1959, p. 125).

³³Prior to this the corporate model had influenced municipal reform. In examining these, Leonard White noted that businessmen provided much of the opposition to "bad government" and that "looking about for a remedy, they were captivated by the resemblance of the city-manager plan to their corporate form of business organization" (quoted in Hays, 1964, p. 159).

³⁴It is ironic that only five years later Berle and Means would announce the growing separation of ownership from control in corporations. Had Willoughby read their work, perhaps he would not have been so sanguine about the "corporate ideal."

³⁵We should note that the machine metaphor of the early administrative theorists implied, with respect to competition, quite a different structure than the mechanics metaphor of the old political economists. The latter, relying on the Newtonian law that for every action there is an equal and opposite reaction (Landau, 1972), sought designs that would minimize the effects of ambition and self-interest. The former saw in the machine the model of perfect coordination; instead of counterpoised parts, they saw specialized but interdependent parts which had to be integrated into a working whole.

³⁶For other examples of prominent public administration scholars advocating organizing by major purpose, see White (1939, p. 106) and McMahon (1937, p. 261).

³⁷Precisely why organizing by purpose would make the bureaucracy more manageable was not spelled out in great detail. Reducing the chief executive's span of control was the most cited factor.

³⁶It was theoretically possible that the departments would become internally competitive, but this was never discussed.

³⁹Of course the principle of unifunctional departments does not by itself eliminate redundancy, since there could be single function departments which duplicate each other. But the unifunctionalists clearly implied the converse--only one department per function--as well.

⁴⁰The federalists were not, however, interested in loyal party opposition; the locus of loyal opposition was to be within the government proper.

⁴¹Authority in this case shifted over to Labor as it was believed that the Bureau of Mines was not actively looking after the miners' safety (Grossman, 1973).

⁴²It may seem odd in a work on redundancy to raise the question of stability; is it not true that "That which is redundant is, to the extent that it is redundant, stable" (McCulloch, in Landau, 1969, p. 352)? That is, one of the main functions of redundancy is to increase the reliability of a system's performance. But as a neurophysiologist, McCulloch did not study systems with internal conflict. I am not questioning McCulloch's proposition on technical grounds; rather I am questioning whether the bureaucratic politics in government permits the organizational basis of redundancy to be stable.

⁴³Of course redundancy is a game that can be played at many organizational levels. An agency head may wish to eliminate external competition while simultaneously maintaining internal redundant channels below him--just as a firm prefers to sell its own goods monopolistically while buying goods in a competitive market.

⁴⁴The same principle holds in reducing investment risk through

portfolio diversification (Markowitz, 1959, p. 102), and probably is a general rule for strategies of achieving safety via diversification.

⁴⁵Similar (and erroneous) mindsets, manifested in assumptions which produce correlated errors, appear to be a problem in many forecasting models (See Ascher, 1978, p. 199). An entire generation of models may share the same dubious premises. If this is so, then of necessity error correction will be sequential rather than nearly simultaneous.

Note that redundancies of this kind, in which actors reproduce a particular orientation and every model is similar, are inappropriate when the solution is not known in advance. In terms of Fig. 1 on page 9, these are redundancies of cells 1 and 2 misplaced into 3 and 4.

For more evidence on the problem of correlated judgemental errors, see Felsenthal and Fuchs (1976, p. 475) and references cited therein.

⁴⁶Not that there was complete consensus on this point: Hamilton and others were more worried about an impotent central government.

⁴⁷For a modern example, consider missile launching from submarines: two crewmen must independently turn keys. If only one does so, the missile will not fire. This is to protect against a disastrous inadvertent launching.

⁴⁸If the errors pertain to accepting or rejecting factual decision premises, instead of taking actions, then the situation is equivalent to the type one-type two problem in statistics.

⁴⁹The problem of type one-type two errors in the context of organizational redundancies was, however, noted by Felsenthal and Fuchs (1976, p. 476):

⁵⁰Unfortunately I have not been able to ascertain whether the attractive feature of geometric increases in overall reliability for arithmetic cost increases obtains in situations where two errors can occur.

⁵¹One could superficially handle these inconsistencies by positing a single general rule such as, use redundancy when it creates net benefits. But such rules are vacuous and obscure the fact that there is no single evaluative dimension in the public sector.

CHAPTER TWO

Introduction

The practical payoff of a strategy such as redundancy can best be studied within a particular policy context. This chapter, then, is a connecting bridge between the general theory of organizational redundancy presented in Chapter One and the policy-specific focus of this dissertation--urban transit.¹ Two dimensions of policy context will be discussed: the decisional context of a redundant structure, defined in terms of the stage of development a transit system is in, and the long-run organizational trends underlying urban transit. We conclude with a brief statement on the cases selected for study in Chapters Three through Five.

The Policy Context

It would have been theoretically acceptable to examine any functional aspect of urban transit in terms of the existence and effect of redundancy. As Landau (1969) and McCulloch (1960) have noted, there are many different types of redundancy--of code, channel, and command, among others. Indeed, Landau has suggested² that there is a redundancy for every organizational function.³ But because part of this thesis's rationale is practical, to illustrate the possibilities of redundant organizational structures, I have chosen to examine duplications that bear a direct relation to organizational performance, namely, redundancy of transit

service and of planning (generation of alternatives) for such service. These two kinds of redundancy help to define the decisional context surrounding duplication, and we now turn to that topic.

Decision Context

The theory of redundancy is closely tied to the nature and intensity of uncertainties which face decision-makers. At the limit, complete certainty (with respect to tasks completed, messages received, and so forth) eliminates the need for any duplication. It is therefore important to study the functioning and effects of redundant systems under different degrees of uncertainty. In urban transit this difference can be translated into a distinction between planning and operating a transit system.

Redundant transit organizations are defined as those which serve overlapping or identical clientele, whose services are substitutable.⁴ This is a functional categorization; hardware differences are irrelevant. Transit agencies which serve overlapping populations are clear instances of the theoretical category, and this lack of ambiguity in identification is one advantage conferred by transit as a case.

The definition of transit planning duplication is derived from the definition of redundant transit service: planning redundancy occurs to the extent that plans, if realized, would create transit service for overlapping or identical populations.⁵ Though redundancy in operations need not entail conflict, I expect that duplication in transit planning will generally be a competitive redundancy because few regions have enough demand, nor has UMTA enough money, to transform duplicate plans into new parallel systems. Hence a choice will usually be made among the competing modes, and duplication pruned back before the operational stage.

The significance of the distinction between planning and operations is based upon the relation between system stage and degree of uncertainty facing decision-makers. Planning is fundamentally more uncertain than operations. In this stage the fundamental transit options, in terms of mode and system configuration, are designed and evaluated. During planning there typically are considerable uncertainties with regard to supply and demand (utility).⁶ On the supply or technical side, there may be uncertainties with respect to, e.g., maintainability, schedule adherence, and equipment reliability. Obviously, the larger the planned leap in transit innovation, the greater the technical uncertainty.

Nor can the demand or operational utility dimension be neglected. A system can be technologically impeccable but its utility in its task environment may be low. Stockfish, for example, observes that inappropriate designs of weapon systems for their operational environment cause failure as often as do technical problems (1973). In urban transit, a system's ultimate utility (reducing congestion, reducing the need for additional freeways, ameliorating air pollution, clustering development) depends upon achieving an intermediate goal, namely attracting a targeted number of patrons. Patronage projections, in turn, are a relatively soft aspect of urban transit planning. There are, in short, numerous points at which transit planners can err.

In contrast, in transit operations the fundamental system choice has been made, and managing an existing structure is less uncertain. And the lower the uncertainty, the less beneficial we would expect redundancy to be. That is, if we heed Klein's argument and view the development of a complex transit system in terms of a gradual reduction of uncertainty, then it follows that at the beginning of system development many alterna-

tive transit options are desirable because it is not known with any great accuracy at that time how the options would perform. Once the basic system is in place and operations commence, most of the uncertainties will be reduced.

Even during transit operations, however, duplication may produce advantages. I therefore now wish to detail in a more specific way the hypothetical advantages of redundancy during planning and operations, and to compare these with the hypothetical advantages of monopolistic planning and operations. First the two kinds of organizational structures for planning will be contrasted, followed by the two structures for operations.

The Case for Monopolistic Transit Organization During Planning

The conventional wisdom presented in most of the urban transit planning literature is that only a single organization should do comprehensive planning. The structure of transit planning is generally held to involve a division of labor and can best be described as monopolistic or single-channel⁷ "generate and test" (Simon, 1964). A single agency generates alternatives, evaluates them, and recommends a single option as a solution, which is then "tested", usually by both a bond election and UMTA review.⁸

The idea of comprehensive planning has had two distinct meanings. First, it connotes an exhaustive search for functionally equivalent solutions. Second, it means designing systems of differentiated and interdependent parts, i.e., mapping out functionally complete and integrated wholes (planning, e.g., feeder and trunk transit or transit and land use consistently). Underlying the idea of exhaustive search by a single agency is an assumption that anything less than this, i.e., modally spe-

cialized agencies advocating different plans, will inevitably offer partial solutions, their vision restricted by their technological specialization. Only a modally unbiased transit agency will survey all candidates and rationally distribute them so as to create a balanced transit system. A fully integrated transportation agency (highway plus transit) could make decisions regarding the relative merits of highway expansion versus public transit investment. The biggest organizational question of transit-highways battles of the sixties revolved around integrating expenditures for alternative transportation investments, which implies a decision center capable of rank ordering and funding projects.

Comprehensiveness includes the concept of complements as well as that of substitutes. Transit systems are composed of numerous interdependent (complementary) components. This sense of comprehensive transit planning means ensuring that inputs are in correct proportions to each other. An organizationally fragmented system will not produce this outcome. As we shall see in the case studies, this requirement can be understood in either a narrow transit sense, the inputs being differing modes or facilities (Chapter Three, Five), or in a wider causal sense, the inputs being any set of causal factors that interact strongly with transit, e.g., land use (Chapter Four).⁹

The most explicit governmental adoption of this conventional monopolistic transportation planning model exists in the planning criteria which UMTA has issued to guide alternatives analyses and capital grant applications. UMTA's guidelines will be analyzed in Chapter Six.

The Argument for Competitive Planning

In comparison with monopolistic planning, I hypothesize that compe-

titive planning will produce a more thorough search¹⁰ of alternative designs. Further, because rival planners have incentives¹¹ to discredit alternative proposals as well as pushing their own, a more critical scrutiny of questionable decision premises is likely. In contrast, I hypothesize that monopolistic planning is highly sensitive to the amount of search effort the designated agency devotes to creating alternatives, and vulnerable to game-playing during design--e.g., the agency comparing a favored alternative with ill-conceived strawmen.¹²

Furthermore, whereas monopolistic planning makes strenuous demands upon the impartiality of planners, in competitive planning it is not assumed that any single planning team is free of bias, nor that any can attain the kind of objectivity described in textbooks. It is assumed that all planning groups have their pet proposals, their blindspots, the alternatives they do not take seriously.¹³ Rather than obstacles to rational planning, these predispositions are essential to the atmosphere of planning rivalry, where the normal status and power incentives for having one's proposal approved are compounded by professional differences regarding the efficacy of different options.¹⁴

It is also hypothesized that competitive planning will shift de facto policy-making power away from bureaucracies and toward elected officials. In the conventional division-of-labor, nonspecialist decision-makers (legislators, voters) must review and make yea or nay decisions on a single option presented by the specialized agency. These screenings follow an extended planning process, and because of the momentum built up in such lengthy projects, it is difficult not to approve the bureau's alternative. It is awkward justifying a rejection of an agency's final recommendation, particularly given bureaucratic monopoly of expertise and

information. This means that although de jure final authority rests with nonspecialists, de facto specialists possess enormous influence. Competitive planning, by eliminating a single agency's claim to being the sole repository of knowledge, provides a basis for reasoned opposition by laymen to any given alternative.

Finally, it is hypothesized that competitive planning reduces the probability that the sheer availability and concreteness of transit hardware will drive other policy choices.¹⁵ In monopolistic planning, selections of transit technology by the transit agency will implicitly shape the feasible land use and development futures of a region, rather than policy decisions on development serving as key decision premises in transit planning. It is generally less controversial for a community to make a choice on transit technology than on higher level goals such as land use patterns, and this tendency is exacerbated when only a single alternative is on the public agenda. In contrast, multiple options, pushed by opposing specialists, will tend to re-evoke latent conflict over the higher order objectives because the different technologies make different development futures appear viable.

The Argument for Integrated, Monopolistic Transit Organization

During operations, an integrated transit agency is commonly thought to have a number of advantages during the operational stage.

(1) A monopolistic transit agency can avoid expensive and unnecessary duplications of investment and effort, particularly if the same mode is involved.¹⁶ That is, it can achieve economies of scale.¹⁷ If the organization operates different modes, as against modally specialized agencies it (hypothetically) attains the less easily measured administrative economies rather than physical scale economies.

(2) A successful multimodal system requires intermodal coordination of schedules, transfers, and the like. It is implicit in conventional wisdom, in public administration generally and transit administration particularly, that only an integrated organization can perform these tasks effectively.

(3) The opportunity cost of (online) operational duplication on certain routes can be service gaps in other parts of a jurisdiction. Some patrons will have multiple transit alternatives while others may have none. This problem will be exacerbated if competing agencies behave like profit-oriented private firms. By allocating their resources heavily to lucrative routes, diminishing service on less patronized routes and at offpeak hours, they would injure "captive" riders, i.e., those who because of age, infirmity or poverty do not have access to autos. A monopolistic transit agency can more easily sustain the burden of high subsidy routes since it is not competing with another organization over the best routes.

(4) A fully integrated transportation organization, which can set tolls on bridges and highways as well as operate transit, could engage in cross-modal subsidization, e.g., charge bridge tolls beyond that needed for maintenance and bond payments in order to subsidize transit. Cross-subsidizing is rational to the degree that transit produces positive externalities and diminishes negative side effects (e.g., auto air pollution). This possibility is unavailable to the operationally unintegrated system.¹⁸

The Case for Operational Duplication

It has already been argued that as we move from planning to operations the function of redundancy declines. However, in the period when a system has just started operations there are always unexpected problems.

and a second transit system will be valuable as a backup at such times. We note that this relationship, unlike planning rivalry, will not necessarily be conflict-laden. If two transit agencies only cover for each other during a break-in period, they are not fighting for scarce resources.

These break-in uncertainties have a secular pattern: they are expected to decline irreversibly. Transit systems are also expected to suffer from episodic shocks that do not have a temporal pattern, such as fires or strikes. To the extent that these disturbances have a known solution but can occur at a number of places, they fall into cell two (see Fig. 1, Chapter One) where routinized latent redundancies play a prominent part. It is not clear to what extent these latencies require the existence of separate organizations.

Operational competitive redundancy, as distinct from noncompetitive duplication, occurs only when several transit organizations are rivals for patrons on an ongoing basis. The anticipated functions of operational competition are increased flexibility on the part of the competitors in terms of the kind of services offered, and lower fares. (Since public transit agencies are tax- as well as fare-supported, competitive agencies could lower fares or improve service quality without achieving cost reductions even if the fare changes did not attract enough riders to offset the changes' cost. Increased losses could be covered by tax returns. This suggests that operational competition could result in larger financial burdens for taxpayers. A political economist who focused upon incentives would argue that a competitive but tax-supported transit agency would have no reason to discover cost-saving changes unless there were a limit on its tax revenues.)

The propositions regarding hypothesized benefits of monopolistic

versus redundant planning and operations are summarized in the table on the next page.

To complete the discussion of contextual factors, we must briefly look at long-run organizational dynamics of urban transit in the United States.

The Long-Run Organizational Context

Until fairly recently, selecting urban transit as a field in which to study organizational redundancies would have been unwise. The industry declined steadily after World War II, as patronage and revenue declined, and many more organizations left the market than entered it. Obviously, in a contracting industry one will more likely find service gaps than overlaps. But with the increasing prominence of public transit organizations, which do not have to support themselves solely from the farebox, the probability of duplication has increased.

Unfortunately, however, I believe that transit's declining profitability makes it unlikely that there are many public-private contracting systems similar to the Lakewood Plan studied by Ostrom, Tiebout, and Warren. Although many transit functions can be standardized (facilitating contracting with private suppliers), and although contracting could produce significant savings, Gomez-Ibanez and Meyer have found that contracting out transit services or functions via competitive bidding is quite rare (Gomez and Meyer 1977; p. 176-178).¹⁹ It is therefore not surprising that none of the cases in this study are instances of mixed (public-private) supply.

The decline of private transit raises a question concerning another general issue raised in Chapter One, the stability of redundant structures.

Summary Table of Propositions (Compare Vertically)

Planning

Operations

<u>Monopoly</u>	<u>Monopoly</u>
<u>Redundancy</u> <ol style="list-style-type: none"> 1. Produces more valid information. 2. More thorough search of alternatives, as well as 3. More information on alternatives which are generated. 4. Lower probability that decisions on transit hardware will unduly constrain other policy processes. 5. Increase influence of nonspecialists in policymaking. 	<u>Redundancy</u> <ol style="list-style-type: none"> 1. Increases total system service reliability during: <ol style="list-style-type: none"> a. breakin period in subsystem development; b. episodic disturbances (strikes, etc.). 2. Competitive redundancy promotes heightened responsiveness to clientele preferences.

(1) Governmental transit authorities are more protected from financial collapse, suggesting that public transit duplication is more stable than private. But they are not totally immune to financial pressures, so instability on this ground cannot be completely discounted.

(2) A redundant transit structure could be destabilized by inter-agency collusion, in which organizations coalesce to present a unified front to external sources of money such as UMTA and state governments.

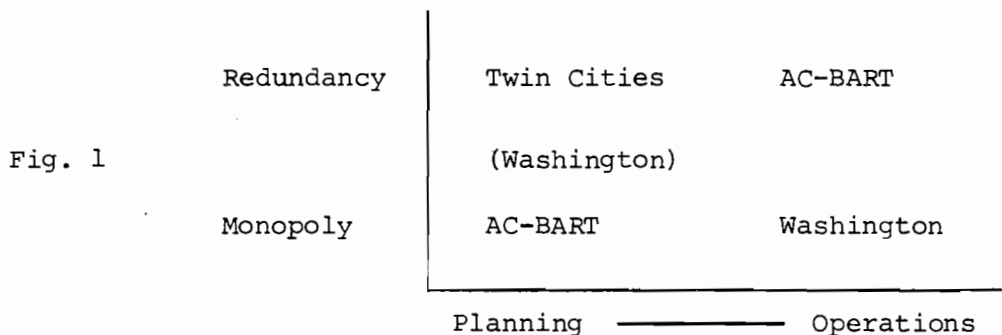
(3) Finally, it is possible that top executives, acting on the basis of conventional administrative wisdom, will reorganize a bureaucracy to remove or reduce redundancy. But because most urban transit agencies are not regular line departments, they are much less susceptible to executive-sponsored reorganizations that eliminate duplication. We therefore expect redundancy to be destabilized more often by inter-agency collusion than by executive reorganization.

We now turn to a brief discussion of the cases selected for empirical examination.

Case Selection

The case studies were selected in order to probe the propositions listed on page 54. They therefore had to vary on the structural dimension of monopoly-redundancy and on the system development dimension of planning-operations. Though pragmatic constraints of time and money precluded covering four separate cases, the three cases selected exemplify the four basic situations.²⁰ (see Fig. 1) The operationally redundant relation exists between two special districts in the San Francisco Bay Area: the Bay Area Rapid Transit District (BART) and the Alameda-Contra Costa Transit District (AC). BART operates only trains; AC, only buses. Their relation-

ship is contrasted with the Washington Metropolitan Area Transit Authority (WMATA), which runs both bus and trains from a single, integrated headquarters. This comparison thus holds technology constant while varying the monopoly-redundancy dimension.



Although AC and BART have overlapping service areas and even originated in the same period, they largely succeeded in avoiding competing with each other during planning. Consequently they exemplify the case of mutual planning isolation or, in effect, pockets of planning monopoly (despite the fact that there are not one but two agencies). The contrasting instance of transit planning competition is the debate in the early seventies between two regional agencies in Minneapolis-St. Paul, the Metropolitan Council and the Metropolitan Transit Commission, over the relative merits of bus and rapid rail. The WMATA system is in the background of the planning competition versus planning monopoly comparison as an intermediate circumstance. Rivalry between modal advocates in Washington was more extensive than in the Bay Area but less thorough than in the Twin Cities.

The last comparison, involving no new cases, concerns the effects of redundancy at different system stages: redundancy during operations (AC-BART) versus competition during planning (Twin Cities).

The point here is to investigate relative advantages and disadvan-

tages of duplication at different periods in the development of complex public systems.

The cases will be discussed in the following sequence: AC-BART (Chapter Three), Twin Cities (Chapter Four), and Washington, D.C. (Chapter Five). We begin with the study of operational redundancy in the San Francisco Bay Area.

Footnotes

¹As often happens, the choice of empirical focus was determined as much by pragmatic considerations as theoretical ones: in this case, a combination of proximity to a clear instance of governmental redundancy--the overlapping services provided by two nearby transit agencies (see Chapter Three)--and research support in this policy area provided the impetus for selecting urban transit as my area of inquiry.

²Martin Landau; conversation Fall 1978.

³This point, I assume, extends to the natural system functions of an organization as well as its artificial ones.

⁴In the ordinary vernacular, redundancy connotes surplus (not merely duplicate) capacity, but this property is rejected as a defining attribute for three reasons.

First, it is not easy to specify what constitutes surplus capacity: what is overabundance for one range of expected conditions may not be for another. Indeed, one of the central points of this thesis, and of the redundancy perspective in general, is that what on first inspection appears to be surplus capacity will often turn out not to be so. Second, with respect to transit service, redundancy in part implies offering patrons a choice; the capacity of redundant organizations could be stretched tight even as patrons were shifting back and forth as they discover which alternative they prefer. Thus one of the main functions of redundancy

could be fulfilled without an oversupply of capacity. Third, including the property of surplus capacity tends to prejudge the issue of functionality, since "surplus" slides quickly into "excess".

⁵As is recognized in transportation planning texts, rarely are two proposed solutions substitutes for identical populations: usually the service areas differ. For this reason the concept of competition in the public sector has inevitably a stronger political component than in the private sector, where firms are competing for an individual's selection.

⁶See Dickey's (1975, p. 326) comment on cost-benefit calculations of transportation projects: "almost all of the entities--the unit costs, the travel volumes, the interest rates, the service lines, and the capital and maintenance costs--have to be predicted for the future and therefore fall prey to inaccuracy."

⁷There can be redundancy in this process, but it is usually seen as a redundancy of iterations on a generate-test-generate again loop, over the same set of decision-makers and planners, not over a competing set.

⁸See Morlock 1978, p. 16; Dickey 1975, p. 16-18; Creighton 1970, p. 136 for examples of urban transportation planning texts which describe the decision process in these terms.

⁹The transportation texts cited in the above footnote usually restrict the meaning of comprehensive planning of complements to the narrower transit sense. This is sensible, because the political feasibility of organizing comprehensive transit planning in the wider sense is more dubious.

¹⁰We must, however, distinguish between the fragmentation that increases competition from that which reduces it. The fragmented financing of modes in the fifties and sixties, in particular the earmarked Highway Trust funds, did not promote intermodal competition. Rather it skewed

local choice by providing disproportional outside support for the auto-highway alternative. Integrating the transportation financing streams by funneling them through a single metropolitan agency which is financially responsible for all transportation investments could increase intermodal competition by increasing the region's capacity to choose between alternative investments. But integrated financing would be consistent with competitive planning only if the planning advocates were organizationally separated from the financing agency.

¹¹The incentives exist because it is unlikely that all the rival plans can be realized.

¹²It is interesting that despite growing professional awareness of the difficulties in every step of the process, particularly the solution generation phase ("The search for or identification of alternative designs is obviously one of the most important steps in the process, but ironically it is one of the least understood" (Morlock p. 11; see also Hutchinson 1974, p. 20)), there is no attempt in these recent texts to move away from a single channel generate-and-test models of planning by introducing devil's advocates, rival planners or the like. With respect to technically qualified actors, the approach is resolutely unredundant. And this has been the central tendency in the planning philosophy for quite awhile: changes in the urban planning texts point to changes in planning techniques, not to the organizational structure which supplies the planning effort.

¹³It is not my intent to minimize the technical dimension of transit planning; it is a technically informed process, which is to say that a great deal must turn on the validity of factual premises. Nor do I recommend replacing a technical planning with a politicized process.

Rather it is to suggest that the approved version misconstrues the social and organizational bases of rationality in planning. It is decidedly not the case that a technical process is incompatible with passionate advocacy and even myopia. Indeed, as students of scientific argument have suggested (Popper, 1963; Merton, 1974; Landau, 1972), it is precisely the prevalence of individual myopia and bias, of disregard for negative evidence and disinclination to develop theoretical alternatives which increases the need for a highly redundant system of theory development and error detection. At root the conventional model of planning confuses the individual and systemic levels: the search for disinterested and infallible planners is doomed to fail; the search for a measure of collective objectivity need not.

¹⁴Clearly redundancy at this stage will be most important to potential clientele if different modal solutions are advocated, rather than being a purely jurisdictional debate over which agency is to control the same modal solution (compare Huntington, 1961, p. 50) because we can plausibly assume that the difference in the ability of the agencies to operate the same mode is considerably less than the difference, in terms of costs and service attributes, between modes.

¹⁵A similar point is made by scholars studying the relation between weapon system development and defense policy.

¹⁶As in the general theory (Chapter One, p. 18), so with transit we must distinguish the budget-cutting perspective of eliminating transit service without merging organizations from the consolidation perspective of merging agencies without cutting service. As there are several public transit monopolies in large metropolitan areas (Chicago, London, New York) that have not eliminated parallel intermodal or intramodal routes, it is

evident that service duplication can coexist with monopolistic organization.

The consolidation perspective in transit is similar to the management-oriented public administration scholars of the twenties who wanted to strengthen the Presidency, while the budget cutting orientation is related to the old Congressional Committees on Economy and Efficiency that tried to reduce programmatic duplication without worrying about organizational merger.

¹⁷Though again we must inquire, following Niskanen, whether an integrated transit agency would have any incentive to exploit potential economies of scale, and even if they were exploited, whether the organization would have any incentive to pass the savings on to users and/or taxpayers. I believe the integrationist perspective in transit, particularly as it is based on scale economies, is based more on an engineering viewpoint than an economic one, as the latter emphasizes the incentives to exploit technological opportunities as much as the opportunities themselves.

¹⁸ To what extent the American political system would tolerate cross-subsidies if they entailed overt penalties on cars is another question. For a pessimistic assessment, see Altshuler (1977).

¹⁹There is, however, some management contracting in urban transit. Firms such as AT&E supply management teams which fill the upper rungs of operating transit agencies. There is competitive bidding for these contracts.

²⁰It should be clear that no attempt was made to establish the representativeness of these cases for a larger population. They were chosen as instances of categories of theoretical interest, and were not

randomly selected from a larger population. The problem of external validity, of generalizing to a larger population, is therefore left unresolved in this dissertation. But in the early stages of empirically probing a theory, finding instances which vary on the appropriate dimensions is more important than establishing their representativeness.

Appendix

Data Sources

There were four different data sources for the three case studies.

(1) I have conducted fifty interviews with AC and BART managers, planners, and operational personnel who had responsibilities for inter-organizational dealings, as well as with several Metropolitan Transportation Commission staffers who participated in interagency meetings; forty-five interviews in Minneapolis-St. Paul with key planners, decision-makers, and observers, particularly in the Metropolitan Transit Commission, Metro Council, and state legislature; fifty-one interviews in Washington, D.C., primarily in WMATA and particularly with bus and rail middle executives and their immediate superiors. The interviews were semi-structured; I had a list of questions for every interviewee, but they could be answered in any order. Since I was usually attempting to elicit a narrative, the questions were open-ended. Because I have promised my interviewees anonymity, interviews are indicated by number only, e.g., (#17).

(2) The transit planning controversy in Minneapolis was well covered by newspapers; coverage was most scanty for the AC-BART case.

(3) Public government documents were most plentiful and germane for the Twin Cities case; least plentiful and relevant for AC-BART.

(4) I was fortunate to gain access to BART memos on AC-BART liaison

matters. In Minneapolis one legislator opened his private files to me, and the library of the Metro Council also provided me with a few (rather formal) letters exchanged between the Council and MTC and several intra-Council memos. In Washington I was unable to obtain access to any informative intraorganizational memos.

In general, data was easiest to gather in Minneapolis-St. Paul, while the data sources for the AC-BART and Washington cases were more uneven. Fortunately the different sources tended to compensate for each other.

In each case, on several key points, different sources did not agree. Either the written records contradicted people's memories (which is to be expected as some events covered here occurred more than a decade ago), or different individual's recollections were inconsistent. When important inconsistencies surfaced, I have tried to indicate them either in text or in footnotes.

CHAPTER THREE

In this chapter we take up the first case study. AC Transit and BART parallel each other on numerous trunkline transbay routes, and Chapter Three examines the origins, characteristics, and consequences of this operational redundancy. The following topics will be covered:

- (1) AC-BART relations during system planning, and the emergence of competition;
- (2) the process of conflict resolution: persuasion and bargaining;
- (3) the stability of redundancy;
- (4) the drawbacks of redundancy;
- (5) the advantages of redundancy;
- (6) reversibility and operational redundancy;
- (7) conclusions.

AC-BART Relations During System Planning

As discussed in the first chapter, the appearance of competition between public organizations is sufficiently problematic as to constitute a question in its own right. Under what conditions does bureaucratic competition appear? In this section I will address that question by

describing the early relations between AC and BART.

It is rare in government to find clear-cut cases of redundancy. Seldom does an executive deliberately instigate competition among subordinates in order to improve the flow of information or give him more flexible options--the oft quoted example of FDR notwithstanding. It is more common for redundancy to emerge from more myopic actions of agencies. So it was in this case.

Origins

Despite a tendency to speak of "the metropolitan transportation problem," in the San Francisco Bay Area in the 1950's there was no single transportation problem; at least none was perceived by the diverse actors who would create the two systems. In the East Bay AC's predecessor, the Key System, a private transit organization that supplied local East Bay service and commuter service to San Francisco, was seen as the primary source of problems. It had been rocked by a seventy-six-day strike in 1953, which so disrupted urban life that public takeover was discussed.¹ (Apparently the possibility of a strike by a public employee union was not then contemplated.) Furthermore, the system had begun the downward spiral in the early fifties that was becoming a nationwide pattern for private transit firms. Patronage fell, costs rose, and service deteriorated as maintenance budgets were cut. The primary issue in the East Bay, therefore, was how to restore reasonable quality and strikeless subregional and local service.

BART, on the other hand, was originally conceived as a nine-county^{1a} regional system with San Francisco at its center.^{1b} The difference in

scale between the two planned systems in the fifties probably emphasized their differences and downplayed their overlap.^{1c} Furthermore, BART was not to be a conservative restoration of an older system, but a bold attempt to try something never done here. It was to circle the Bay with a completely new rapid transit system that could effectively compete with the auto and reduce traffic congestion. By ensuring a steady flow of commuters into downtown San Francisco, it would help preserve its pre-eminent status as an employment center.² Regardless of which description of the BART coalition one believes (see footnote 2), it is clear that in the mid- and late-fifties the two embryonic systems could not have been viewed as alternative solutions to the same problem, since they faced two distinct problems. The difference between coalitions advocating the new public agencies was indicated by their distinct memberships. The only significant overlap was Clair MacLeod, an early BART board chairman, who simultaneously sat on AC's board. Given that there were different groups, which perceived distinct problems and conceived solutions of different scale, innovativeness, and leadtime, it is not surprising that early system planning was not competitive^{1d} (not in the sense that the Twin Cities was: neither agency criticized the other's plans).

There was one critical juncture in the fifties when AC and BART could have clashed in a manner that would have highlighted their potentially redundant relation. The use of different technologies by functionally overlapping agencies can obscure a redundant relation. Consequently it is important to sketch out the modal choices made by BART and AC in this period. In both cases the modal choice process bears little resemblance to transit planning as it is understood today.³ There was relatively little "alternatives analysis." BART moved quickly to a

rapid rail selection: "Rapid transit must be a train system. . . .We must, accordingly, search for the Bay Area facilities within the envelope of possible train equipment" (Parsons, et al., 1956, p. 49). Buses, which would have brought them dangerously closer to duplicating the Key-AC system, were dismissed quickly, their slowness because of congestion being the main objection (ibid., p. 51). After the 1956 report, BART's modal choice was fixed.

AC had a greater chance of winding up with a technology similar to its neighbor's. The Key System had run trains across the Bay Bridge for nearly twenty years, but in 1957 it petitioned the California Public Utilities Commission to allow it to abandon them and run buses instead, and the PUC approved the petition. AC's consultant, DeLeuw, Cather & Co., had "strongly advocated rail rapid transit (possibly pneumatic tired) or some separated right-of-way reserved for transit alone as absolutely essential to the adequate handling of future growth of transbay traffic" (AC minutes, 11/14/57, p. 3). Charles DeLeuw personally opposed removing the Key trains.⁴ AC took the issue to the PUC and maintained in 1957 that it would take over the trains, but the Public Utilities Commission let its original decision stand. While AC could have appealed the decision to the State Supreme Court, AC's board voted four to two to abandon plans to take over the trains. One of the minority, J. Arnold, claimed that the board was not putting up enough of a fight and that Clair MacLeod, who had voted to drop the train appeal, was in a conflict of interest due to his dual membership on AC and BART boards. (The charge was not totally implausible. The 1957 DeLeuw report had warned that failure to adopt their recommended option of rail shuttle across the bridge would necessitate constructing a more expensive underwater tube, and BART consultants

by 1956 had recommended an underwater tube as part of their "optimum plan"). Arnold's charge and call for MacLeod's resignation went nowhere, and the matter was settled: AC would take over only the Key buses. Had they followed their consultant's recommendation and successfully appealed the PUC decision, BART would have been faced at the planning stage with an agency that not only fulfilled part of BART's functions, but did so with basically the same technology. An early competitive struggle would have been difficult to avoid. But Key proceeded to change to an all-bus system in April 1958, and the potential clash was averted.

Early Affirmations of Division of Labor

Although in this period modal choices were the most important decisions in avoiding early competition, spokesmen on each side also made gestures indicating that a division-of-labor agreement was implicitly reached. BART supported AC's bond election attempts in 1958 and 1959; had BART anticipated AC becoming a rival it probably would not have lent a hand. And AC's 1958 "facts brochure" promised, possibly in exchange for BART's support, that

When the five-county district begins operation 7-10 years from now and takes over transbay service, the ACCTD will continue to operate the network of local lines and provide feeder service to rapid transit stations. (quoted in Kennedy, p. 10)^{4a}

Of course both organizations were then struggling for their existence--AC lost that 1958 bond election and barely won in 1959, while BART was several years away from its bond election--and it is likely that each thought it prudent to concentrate on promoting itself rather than to waste

energy attacking the other. It was not obvious then that either district would come into being, much less both. And for AC it was particularly easy to state that its transbay jurisdiction would be only temporary. Its leadtime was much shorter than BART's and for a while that difference alone would protect it. Besides, who knew how long the interim would be (#33)? The reader should remember that in 1956-60 no rapid transit system had been built in the United States for decades; it may have been easy for AC to believe that it would never happen in the Bay Area.

Emergence of Competition

After several years of AC operation, cracks in the informal division-of-labor agreement began to appear. There were several distinct signs of this breakdown in the early and mid-sixties. In 1962 the Alameda County Highway Advisory Commission had DeLeuw, Cather & Co. write a report on the effects of rapid transit on AC. AC provided information about its operations, but BART consultants supplied assumptions concerning future service. The consultants assumed AC would discontinue all transbay service. The study predicted that in 1969 (then assumed to be BART's opening date), AC would have without BART, a surplus of slightly over one-half million dollars; with BART and no transbay routes, a deficit of nearly three million dollars. AC's general manager, Ken Hensel, quickly observed that "these assumptions by BARTD consultants do not necessarily reflect present or future decision of policy of this district" (Transit Times, July 1962, p. 2).⁵ He was backed up by a board member's statement at a meeting with Oakland businessmen: "Such policy decisions (the assumptions made by rapid transit engineers and used in the DeLeuw

report) cannot be made until a full and complete understanding is reached between the rapid transit district and AC Transit" (Transit Times, October 1962, p. 10). This signalled a pulling back from what BART consultants perceived, with some justification, as a commitment.⁶ It was, however, not yet a denial.

In 1965 the AC board passed a motion which more strongly indicated a shift in their public position. The stimulus for the motion came from

recent press articles pertaining to future transbay operations of this District, and of the future utilization of the San Francisco Transit Terminal. He noted that these accounts appeared to be written from the standpoint of an assumption that AC Transit would terminate its bridge services coincidentally with the commencement of transbay operations by BARTD. President Coburn felt it incumbent upon the District to correct any misapprehension in this area, observing that such abandonment was not contemplated. . . continuing discussion developed the consensus that the District's transbay services should continue to be performed so long as public convenience and necessity actually require them.

(AC minutes, 14-65)⁷

The board unanimously passed a motion that BARTD and the Toll Bridge Authority, among others, be informed of its position.⁸

What happened between 1958 and 1965? Why did AC turn from a near promise to cede the transbay routes to affirming its right to maintain them? First, there probably was not as much policy change as appeared publicly, particularly at the general manager's level. One interviewee (#C2) recalled that the first general manager's statement that AC would give up the transbay lines was only for public consumption; inside the organization his position was different. Once AC became well established, longstanding hidden preferences emerged. But second, and less deviously, AC's board had genuinely changed. The key linking pin with BART, Clair MacLeod, left AC in 1958. Bob Barber, another director who might have

believed that BART should take over transbay lines (interviewee #C2), left in 1963. And those who remained had different facts at their disposal. One former director said that in 1958 the inexperienced AC directors simply had no idea which routes would turn out to be moneymakers (#33). By 1962 they had accumulated enough experience to realize that transbay runs were, by and large, economically the best. Certainly this would have been evident by 1965. Eastbay routes peaked in 1963-64 and started a slow decline; transbay routes climbed steadily from 1960 on.

Emergence of Competition and Barriers to Entry

We must retrace our steps to explain how redundancy appeared in this system. Normally in any government-dominated domain there are barriers to the entry of new actors. And the higher the entry barriers to a policy system, the lower the probability of competition. Entry barriers may be legal--e.g., only one general purpose government at the same level may have jurisdiction over an area--or financial--programs in the policy area being too expensive for new agencies. In the AC-BART case the device of the special district was essential in permitting emergence of overlap. Unlike traditional general purpose governments, there is no limit to the number of special purpose agencies that may occupy a region. (Of course, it may generally be presumed that precisely because they are special purpose entities, there will be no functional duplication despite territorial overlap. A mosquito abatement district and a transit district are not redundant.) There was no legal barrier, then, to the Legislature's creating the two-county AC district in 1955 and the five-county BART district in 1957, despite their common territories.

But the state's bills did not by themselves establish viable or-

ganizations; both AC and BART required passage of bond elections. There were two potential stumbling blocks in each case: county supervisors had to approve putting the matter to the voters, and the voters had to approve the bond at more than a simple majority (sixty percent for AC, 66.7 percent for BART). When considering the overlap that exists today, it is important to keep in mind that these were high hurdles facing formation of both agencies, and it was possible that neither would make it. As it was, San Mateo's Board of Supervisors withdrew their county from the BART district, and Contra Costa Supervisors barely approved putting the BART bond issue on the ballot (three to two, with a last-minute change). The Legislature lowered BART's passage hurdle to sixty percent, and even so the bond passed with only a 1.2 percent margin. AC required still more help with its bond election. The Legislature lowered required approval from sixty percent to fifty percent, which was fortunate for the new system since it garnered just over fifty percent in 1959, after having failed in 1958.

Once both organizations were legally established, the stage was set for disagreements over jurisdiction, and for attempts to resolve those disagreements. We now turn to these topics.

The Process of Conflict Resolution: Persuasion and Bargaining

We have seen that early agreements regarding the division of labor showed signs of strain by the mid-sixties. But as argued in Chapter One, agencies can often establish or re-establish nonintervention pacts, even without the aid of an outside mediator, and thereby create a nonredundant domain. Was this attempted by AC and BART? If so, how and with what

success?

The answer to the first question is yes, a repetitive yes. BART's files reveal that the first serious questions on coordination (eliminating duplication and ensuring complementarity) were raised in 1963, and numerous staff meetings were held in 1964. They would continue to take place off and on for nearly a decade. But as we shall see shortly, the duration of the effort indicated lack of progress more than success in reducing duplication.

When two public agencies functionally overlap, there are several decision strategies that may effect differentiation: command, bargaining, and persuasion.⁹ The simplest is command, where one authority instructs a second to leave the policy field. This presupposes a hierarchical relationship. Both BART and AC were prohibited to

interfere with or exercise any control over any transit facilities now or hereafter owned and operated wholly or partly within the district by any city or public agency, unless by consent of such city or public agency and upon such terms as are mutually agreed upon between the board and such city or public agency.

(PUC Code, sections 25803 and 29037)¹⁰

In addition to legal safeguards, AC's reputation helped protect its jurisdiction. AC was widely regarded in the East Bay as a well-run organization (Zwerling, 1974, p. 108), making it difficult for BART to use political clout to shunt it aside.

That leaves persuasion and bargaining. Persuasion involves changing another's perception of the situation by providing information the other lacks or by offering new criteria for interpreting information. In bargaining one takes as given the other's perceptions and instead

alters the objective consequences of alternatives by offering incentives. A contract, for example, formalizes a bargain that requires no change of mind by either side. Persuasion is clearly cheaper in terms of money or policy concessions, but its use is restricted to circumstances in which there is sufficient goal consensus to treat the disagreement as primarily technical.

It is striking that in nearly ten years of AC-BART talks on route coordination, persuasion completely predominated over bargaining. Regardless of the private goals of the boards and top management, public discussion was couched in terms of reaching an agreed upon goal, such as maximizing the total number of transit riders, regardless of mode. This made it appear a problem for which persuasion was an appropriate strategy, even though DeLeuw predicted in 1962 that AC's finances would be significantly injured by eliminating the transbay routes.

We can sometimes expect persuasion to eliminate competition, e.g., when it is in the other agency's interest to withdraw from the policy field but for some reason it has not yet realized that. In AC's case this would have been because its cost and revenue data were poor, or its accounting rules inadequate, and the bridge routes not as solid as they seemed. Persuasion would have involved BART showing AC that this was so. But although AC's data are rough, the differences between most commute runs and most locals were large enough to provide a substantial margin for error. BART may not have known this in the sixties. One AC director recalls that BART General Manager Stokes tried to convince AC that they "would get rich feeding BART" (#33), and a BART memo states "Our consultants said that rapid transit . . . will have a highly beneficial effect on local feeder bus operation" (1964). AC was not persuaded.

Indeed, AC-BART route coordination talks, throughout the late sixties and early seventies, as the issue became more important, were mutually unpersuasive. As Stokes candidly told his board, "the BART staff has been unable to bring AC staff around to their point of view, and conversely, AC staff has not been very convincing either" (BART memo, 1/27/71). One BART staffer, who had participated in the meetings, remarked that "the meetings accomplished nothing. . .we argued for years" (#4). The Voorhees report of 1973 substantiates this point. The report was still going over the parallel route question which had been raised in meetings going back to 1964, thoroughly discussed in the Simpson-Curtin report of 1967, and brought up in (primarily) staff and board meetings between 1967 and 1973.¹¹

The use of technical consultants rather than mediators underscored the orientation toward persuasion. Transit consultants are neither trained nor authorized to bargain; they gather data, recommend service changes, and the like. Although Simpson-Curtin and Voorhees advocated eliminating different numbers of parallel routes (Voorhees having been more cautious), neither discussed what was to be done about AC's finances after transbay competition was reduced. There was, for example, no mention of establishing a Hamburg-type agreement of maintaining status quo ante fiscal conditions.

Efforts at persuasion can focus on rules as well as on factual estimates. AC's primary criterion for comparing competitive routes was travel time. In their routing proposals they said that transbay routes would be retained where riders could travel faster by bus than by feeder plus rail (Transit Times, July 1970, p. 3).¹² In a memo distributed by Stokes at the major AC-BART board meeting of January 1971, Henry Bain

argued that this criterion was inadequate. He proposed several others to take its place: (1) minimizing total travel time (not just vehicle time); (2) maximizing reliability (buses are subject to congestion); (3) minimizing cost (BART's marginal costs of carrying transbay riders is less than AC's). I have no recorded response of AC to this proposal, which suggests a kind of reasoning backwards from conclusions: given an organizational goal of avoiding financial trauma, what criteria will help achieve it?

There is, however, no need to be completely cynical about the agencies' adherence to publicly-stated criteria, such as maximizing total transit ridership. There are hidden goals, but the goals in public view are no doubt also held.¹³ BART was unable to persuade AC to drop its transbay lines partly because AC officials were unconvinced, on factual grounds, that BART would provide superior service (#3, 8, 22). In the face of relatively certain knowledge that AC would be damaged by voluntarily withdrawing from transbay competition, BART would have had to demonstrate overwhelming superiority to have been persuasive. This it could not do a priori, which allowed AC to propose a test of experience--let the rider choose.¹⁴ Using that rule enabled AC to maintain a close relation between what benefitted AC and what benefitted the transit public. Had AC used Bain's more complete set of criteria (which included cost to taxpayers), it would have been difficult to assert such a close identity between organizational and general welfare.

AC's use of a simple trial-and-error approach was consistent not only with its organizational interests, but also with its Standard Operating Procedures. These rules, such as increasing a route's frequency when the load factor rose past a certain level and decreasing it when it fell past another, reflected a general orientation toward a reactive decision

strategy that BART did not share. In a memo to assistant general manager Larry Dahms, BART's chief of contract administration wrote that AC's secretary "made it plain that AC. . .is not

going to negotiate further the transbay routes question-- at least not this time. . .It is evident he isn't sure what AC is going to provide during BART's start in 71/72--saying it isn't entirely forecastable. You evidently have a strong feeling that some figure in the "ballpark" of the NCTDP (5 routes) is or should be forecastable at this time. It appears to me that this difference between you and Wolf on the one hand, and George Taylor and Sam Davis (AC) on the other, is the precise point--more so than the number of routes.

(November 16, 1970, original emphasis)

BART, then, was bucking up against AC's organizational routines as well as preferences.

Why did BART persist in trying to persuade AC, after years of fruitless effort, instead of buying it off or compensating it in some manner? The first and most obvious explanation is that persuasion is the cheaper strategy; at most it costs headaches and personhours spent in meetings. Then, too, when competing bureaus negotiate division-of-labor agreements, the payoff is often policy rather than money--each agrees not to invade the other's sphere--but this option was not open to BART. There was no other part of AC's service territory that BART could promise to avoid in exchange for AC's promise to remove duplicate runs. It is hard to conceive of any non-monetary policy concessions that BART could have offered AC. As to money, the obvious compensation, BART never had much to spare. By the time the coordination efforts were most intense, BART's cost overruns had become apparent. Furthermore, BART management felt that AC had more property tax to draw on. As Stokes pointed out to

an AC director who raised the matter of revenue-sharing, "AC has considerably more authority to affect the balance between raising fares and raising taxes than does BART" (June 18, 1971). There was probably also an attitude within BART that it would not have been proper to compensate AC; one BART consultant wrote to Dahms that AC

is laboring under some serious delusions, such as that BART is a "customer" that might pay AC Transit for service, rather than a public agency that shares responsibility for serving the real customers.

(Bain, January 22, 1971)

Finally, I think that BART had expected, from the beginning, that AC would voluntarily eliminate redundancies. This expectation was in part nourished by AC's own early statements--which BART did not forget. In BART's files can be found a copy of AC's 1958 "Facts about the ACCTD Plan," with the key phrase, "When the five-county district begins operation seven to ten years from now and takes over transbay service . . ." underlined. (BART sent AC a copy of similar statements written by a 1958 AC-BART liaison committee, to which AC replied that it was an informal conference whose recommendations its board never formally adopted.) And in part the expectation was sustained, though this is more conjectural, by a belief that AC would have to step aside for the new system(#22).

What about involvement of outside actors? If independent agencies cannot voluntarily settle a jurisdictional dispute, sometimes outsiders or hierarchical superiors can resolve it. Originally Bay Area transit agencies formed a flat organizational system. Unlike most of the examples of national bureaucratic competition mentioned in Chapter One, there existed here before 1971 no close superior institution which could or

would exert much authority. The California PUC did not have jurisdiction over route choices of public transit organizations. The issue seems not to have reached the state Legislature (#36).

In 1971, however, the Legislature established the Metropolitan Transportation Commission. This agency's major raison d'etre was coordinating independent operators, and the issue of overlapping jurisdictions falls solidly within its purview.¹⁵ But the timing of the Commission's entry into the system mitigated against its playing a large role.¹⁶ The competitive issue peaked in 1970-71, just as MTC was forming. Its leadership chose--deliberately, it appears (Jones, 1974)--to proceed cautiously in its early years, and eschewed a directive posture. Furthermore, MTC was understaffed (#7). Finally, BART, though it may have wanted to use MTC to force AC to withdraw parallel routes, was in no position to influence MTC. By the early seventies BART's political reputation was tarnished. Financial problems were emerging, its schedule had slipped, and construction had disrupted several cities for some time.

The result was a lowkeyed effort by MTC: it helped organize and finance the last major AC-BART coordination project in 1973,¹⁷ but did not prescribe a solution. The Commission has gained new powers since then, but the issue has not yet resurfaced on its crowded agenda.¹⁸

Unable to persuade, not in a position to command, and partly unwilling to bargain, BART could not establish a conventional differentiated division-of-labor with AC. After 1972, before BART opened its transbay line, the problem of overlapping functions receded in importance for BART; the far more significant problems of system financing, procurement, and reliability became even more critical. It was not just a function of a crowded agenda, however: BART's impaired short-term capacity

was making the competition question moot. BART was encountering so many problems in obtaining reliable cars that in September 1974 the board requested the PUC to forbid Greyhound, which was serving eastern Contra Costa commuters, to terminate its routes.¹⁹ BART's capacity problems meant that temporarily demand for combined peak-hour transit transbay service exceeded supply, which reduced the conflict between the two agencies since they were no longer competing for a scarce resource.

But the issue has never been resolved, merely set aside. The title of this section is therefore a misnomer: there was no conflict resolution in the ordinary sense. BART and AC have "agreed to disagree"-- for the time being. Interviews with BART personnel indicate that the issue, though quiescent, is not dead.

Interagency conflict resolution, when conflict concerns overlapping jurisdictions, is intimately related to the question of the stability of redundant structures, a problem we now address.

The Stability of Competitive Arrangements

Chapter One pointed out that an empirically observed but theoretically untreated problem in bureaucratic competition is the question of stability. Organizationally speaking, how stable are redundant structures? Are they likely to be eradicated by mergers?²⁰

I was surprised to discover that merger proposals have been few and far between. AC, of course, has issued none. But even in BART, it has not come up often.²¹ One director raised it in 1969, but his colleagues regarded it as a long-term question which, even if it should be done eventually,²² did not require immediate action (#36). At the mana-

gerial level, Herringer did say when he started as BART General Manager that it was a big mistake not to have one integrated agency, but this constituted only an opinion, not a proposal for action. At the planning staff level, interviews suggest that there is more concern with service "rationalization" than organizational merger.

Outside of the two operators, little attention has been paid to this possibility. A state senator, John Knox, called for a merger of AC, BART, and Muni in the early seventies, but there is no indication that his proposal was seriously considered, and he has not persisted.²³ Currently in the legislature only Senator Alquist appears to be interested in the merger idea (#C1). The Metropolitan Transportation Commission, the other likely source, has not broached the idea in public, although a staffer said that the staff discusses it (#5).

There are legal obstacles, as well as organizational resistance, to merger. AC's jurisdiction includes only parts of Alameda and Contra Costa, while BART's includes both those counties and San Francisco as well. Merger would require charter revisions.

At one time both a preference for organizational autonomy and financial stability pointed AC in the same direction--to oppose merger. AC's organizational interests promoted competitive stability. But Jarvis-Gann has ravaged AC's finances, while BART is buttressed by the productive sales tax. It is conceivable that AC's precarious financial condition will lessen its resistance to merger. At the same time, however, Proposition 13 probably makes BART leery of merging with an impoverished AC.

It is likely that competition will prove unstable in this case more because of service rationalizations than merger.²⁴ Jarvis-Gann

makes AC more dependent upon the Transportation Commission for financial support, and that may give the latter the leverage it needs to effect a route realignment which I believe is a latent organizational objective.

In any case, whether redundancy proves organizationally stable cannot be the whole story. The next key question is, what are the consequences of redundancy for nonbureaucratic actors? The next two sections speak to this query.

What are the Drawbacks of Redundancy?

No organizational arrangement is free of problems, and this one is no exception. What are the disadvantages of redundant operating agencies? The answers fall into two classes: (1) Allocative inefficiency--do the redundancies cost too much? (2) Organizational difficulties--has competition between AC and BART impaired their efforts to cooperate on integrating complementary (nonoverlapping) services?

(1) About twenty years ago the two special districts predicted that they would be financially self-supporting.²⁵ Had the predictions worked out this discussion would be less necessary. One of the most telling criticisms of redundancy in the public sector (one mentioned by several BART interviewees) is that unlike the private sector, nonusers must also support redundant channels via taxes.²⁶ If riders produced a financial surplus for AC and BART, that criticism would be deflected. Though there are no free lunches, duplication is less offensive if the earter pays.

But obviously both organizations are subsidized, so it seems that non-riding taxpayers pay for duplication. The matter, however, is more complicated. Most transbay runs do well financially, so taxpayers

would not save much if they were eliminated. Then, too, some taxpayers are transbay auto commuters, and that group would suffer from increased auto congestion (of an indeterminate amount²⁸) should the transbay bus lines go.

An alternative way of looking at redundancy's cost is not to suggest eliminating transbay runs, a straightforward budget cut, but to argue that for a fixed total (AC plus BART) budget the public could receive better service. Those same buses and drivers that now serve transbay commuters could be put to better use elsewhere--feeding BART stations, for example. To understand this move's implications requires estimating the proportion of AC riders who would switch to BART if there were no transbay buses but if there were more feeder buses. It would be difficult to estimate this: the recent AC strike would probably provide a poor approximation. My impression is that the shortage of station parking constrains access to BART more than feeder service does, but one can not be certain of this.²⁹

Perhaps we should not focus on transbay commuters--they at least have alternate modes available--and focus instead on captive riders in the East Bay. As David Jones suggests, for the worktrip there usually are redundant modes, but for nonwork trips, particularly by the poor, the handicapped, and the elderly, there are not. For these there may not exist even one mode. And as noted in Chapter One, overlaps in one domain can produce gaps elsewhere. Even if more local AC runs would not greatly increase BART commuter patronage, they may help transit-dependent riders whom BART cannot reach. This kind of division-of-labor (the inverse of redundancy) does make some sense because of the large technological differences between the two agencies: AC can help the transit dependent

much more easily than BART can.

Post-Proposition 13, however, makes the last point of academic interest only. AC is much more likely to use a budget-cutting strategy (if only by not adding more buses at the peak, despite increased demand) than a reallocative one.

(2) Can competition and cooperation coexist? Implicit in many discussions of jurisdictional conflicts is the proposition that bureaucratic competition in one domain inhibits cooperation on other fronts, where the agencies engage in complementary actions.³⁰ In what ways could we expect this inverse relation between competition and coordination to hold in this case? First, there may be a technical relation between functions, so that competition in one function necessarily impairs cooperation in another. As the above section on allocative inefficiency indicates, one type of complementary function--the amount of bus feeder service--is directly constrained by resources devoted to redundant service.³¹ Here the inverse connection between competition and cooperation can be asserted to be very strong because it can be argued that bus and rail must cooperate in order to compete with the auto. Elsewhere, technical relations between substitutes and complements are not strong. Consider the problem of transfers. This issue did require numerous meetings to resolve, prima facie evidence that BART and AC were finding coordination difficult. But this had little to do with parallel routes. The transfer problem turned on finance (how should free rides be absorbed?) and technology (what kinds of transfers are feasible given BART's automatic fare collection and AC's no-change system?). These issues could easily arise between two differentiated agencies. Similarly, the stations' physical designs have presented problems for bus-rail patrons, but these difficulties were not

due to AC-BART competition since the stations were designed before redundant services became a hot issue. The problems seemed to stem from the fact that BART contractors did not design the stations with bus requirements in mind (#22, C3). Again, this problem is typical of relations between differentiated, interdependent agencies, and does not depend upon functional overlap for its manifestation.

Second, an inverse relation between competition and cooperation may hold because when organizationally the different functional areas are closely tied, antagonisms spill over from the domain where rivalry exists to other functions. The better insulated the issue areas are, organizationally, the less the proposition should hold.³² In BART and AC the spheres of competition and cooperation were not well-insulated from each other at the policy and planning levels. The staffers who met in the early seventies to resolve disagreements over transfers, feeders, and physical connections were the same people who met to discuss parallel routes. The same board committees met to discuss questions of complementary and competitive service. And the general managers, Bingham and Stokes, were also involved in both sets. There is therefore reason to believe that there could have been a negative spillover, and that because agency officials saw themselves as representatives of rival organizations, coordination suffered. The data, however, do not show a clear pattern. On the one hand, there is evidence that some bitterness and personal antagonism between certain agency personnel may have interfered with coordination (#4, 5, 22). But how much is due specifically to the agencies having redundant functions is hard to discern. And on the other side of the ledger, not only can several of the personal relations be described as instances of friendly rivalry, external constraints prevented illwill (if

it existed to any deep degree) from having serious effects. Several inter- and intra-organizational memos showed an awareness that if the agencies did not cooperate on obvious links such as feeders and transfers, "the newspapers will crucify us." One BART official wrote bluntly:

If our inability to "bend the will" of AC on transbay routes holds up virtually all other progress much longer, it appears to me that both BART and AC are in an untenable position with respect to the public--not to mention our own management.

(Preston, 1/16/70)³³

Presently, several years after the major coordination efforts, there is more division of labor between those officials who discuss overlapping and those who focus on complementary relations. The Regional Transit Association is composed of six functional committees, in addition to the general managers' committee, and the issue of redundancy is discussed in only one, the services and tariffs committee.³⁴ Interviews with BART and AC representatives on four of the other five committees did not reveal any negative spillovers.³⁵ Indeed, concerning functions such as procurement and some personnel training, AC and BART are so dissimilar that they can neither affect each other nor act jointly, so the problem of spillover from redundant functions cannot arise.

Vertically, there is sufficient differentiation so that the old policy disagreements at the top do not seem to affect supervisors responsible for ensuring that routine coordination proceeds smoothly (#11, G2, G3). Routines insulate operations from conflicts elsewhere.

In summary, the evidence in this section does not support a strong version of the competition-cooperation thesis, i.e., that the former precludes the latter. The data are sufficiently inconclusive, however,

so that we cannot dismiss the weaker version that competition impaired cooperation, though I think that we cannot attribute the bulk of coordination difficulties to rivalry.

What are the Advantages of Redundancy?

The drawbacks of redundancy are well-known; the benefits less so. In this section I will discuss several different kinds. Since the theory of redundancy is primarily concerned with system-functioning in the face of uncertainty, the two major classes of benefits pertain to two kinds of uncertainty, developmental and episodic.

(1) BART's developmental uncertainties. Any complex new system requires a period of debugging, and BART is no exception. Unfortunately, owing to a combination of schedule slips and political pressure to get the system operating quickly, the nonrevenue testing period that had been scheduled was squeezed out. BART started operations while still debugging; the result was, and to a lesser extent still is, an unreliable system.³⁸ Assuming that one goal of either BART or AC is to get commuters out of their cars, to have only one means of public transit across the Bay Bridge while the trains were unreliable would have been risky. How many patrons would have become frustrated and gone back to their autos had they been forced off a reliable system and onto an unreliable one in 1974? While I do not know how to estimate that figure, Wachs's review of consumer attitudes toward transit noted that patrons greatly value schedule reliability,³⁹ so we can infer that the number could have been significant (cited in Altshuler, 1979, p. 115).

Furthermore, because of a variety of problems such as a strike

at a Rohr plant and difficulties with car brakes and motors, BART opened with far fewer cars than they had anticipated. These problems lowered capacity and worsened load factors (ratio of people to seats). In June 1975 the load factor during the peak on the Concord line was 1.77; on the Fremont line it was 1.35 (BART patronage report, June 1975). Because of these unexpected troubles, BART, particularly for the first two years of transbay operation, could not carry as many people as had been expected. Therefore, bus routes which even directly parallel BART, such as the "E" line which parallels the Concord line, were not redundant (in the pejorative sense) a posteriori, since there was no excess capacity. But it is important to remember that during the planning stage BART expected that rapid transit would have sufficient capacity to make parallel bus routes superfluous. What appeared as excess in the early, optimistic stages of BART development turned out to be the bare minimum--for the first few years at any rate. Of course, had there been no problems with the automatic train control system, the cars' brakes or motors, car procurement or central computer design, perhaps a ninety second headway would have been attained in 1974, and more duplicate bus routes would have constituted excess capacity.

This, however, is not how affairs turned out, partly because the above problems did occur and partly because BART's design is sensitive to failure. Indeed, as former general manager Frank Herringer commented, "when they built BART they did not really anticipate that things would fail and they did not allow for the system to continue operating when something went wrong" (Washington Star; January 25, 1978). Ironically, though BART's hardware was intentionally built with the expectation that operation would be error-free, the interorganizational transit system un-

intentionally behaved (via maintained duplication) as if errors were expected. Designed technological fragility was compensated by undesigned organizational redundancy.

Development problems, unlike episodic disturbances, have a direction. BART has become less failure-prone and less failure-sensitive, and this trend will probably continue. BART's capacity will continue to increase, which suggests the possibility of an absolute decline in the amount of redundancy needed in transbay transit.

(2) Episodic shocks. These, by definition, can occur at any time. Since they have no developmental component, we cannot expect them to subside as a system ages. Episodic disturbances require only latent, not active, redundancies. For this reason I believe that it is less necessary to embed them in independent organizations. Redundancies that take over only when one channel is paralyzed by an emergency are less of an organizational threat than those which are continuously active.

(a) Strikes. During this study's research, there was only one major strike since BART started transbay operations, so we have only this instance in which to examine their roles as mutual backups. BART's transbay patronage jumped immediately following the November 21, 1977, start of AC's strike. In the latter part of November, weekday transbay lines increased an average of thirty-six percent (the Concord line lost fifteen percent because of the loss of AC-operated express feeders; the Richmond and Fremont lines gained better than seventy percent.) December exceeded November by twenty-four percent, the previous December by fifty-six percent, and its forecast, which had not anticipated the strike, by forty percent (BART patronage report, December 1977).

Between BART and carpool increases, auto traffic increased only

marginally. December 1977 was only two percent higher than November, and four percent higher than December 1976. It is therefore not surprising that a Caltrans official told me that the strike "had strangely very little impact" on congestion even during peak hours. Operational redundancies reduce the effect of any one channel's breakdown.

We can compare this with the AC strike of July-August 1974, before BART's transbay start. Auto traffic increased in July by 9.4 percent over June, and by almost eleven percent over July of the previous year (California DOT. Summary Toll Collection Record, 1968-1979). If these increases were concentrated in the peakhours, as is likely, the absence of a transit backup would have been still more significant.

(b) One-day technical breakdowns. These are not pure episodic shocks since we can expect their frequency to decrease as BART troubleshooting proceeds. But it would be unrealistic to expect them to disappear. Even AC, which has operated transbay runs for eighteen years and is hardly in a developmental phase, has prepared emergency plans with BART if the Bay Bridge is closed by fire, airplanes hitting the decks, etc. So far AC has not had to avail itself of the "train bridge", but BART has used a "bus bridge" about twelve times from 1973 to 1978. This redundancy is made routine to the point of codification (the first standard operating procedures were issued in 1974), and bus substitutions have worked smoothly.⁴⁰ The connection between service redundancy and independent organizations is weaker for this class of disturbances than for strikes. There is little reason to believe that a single multimodal organization, or two nonoverlapping ones, would not prepare this kind of backup (see Chapter Five on Washington, D.C., p. 212).

(3) Redundancy and differentiated service attributes. Some prob-

lems are frozen permanently into a system's design. They are neither developmental, amenable to debugging, nor are they episodic. Service characteristics, particularly BART's, fall into this category. When these systems were planned in the 1950s, knowledge concerning the service attributes that passengers wanted was meager. More precisely, the correct weighting of preferred attributes was unknown; obviously speed, reliability, and safety were known to be desired. But building a system always entails weighting of, and tradeoffs between, attributes (see Webber, 1976, p. 100).

In the face of demand uncertainty, a hypothetical centralized planner could hedge his bet by designing systems with different service characteristics. In effect AC's and BART's modal choices produced that diversity: notice that in the table of BART design tradeoffs on the next page, trains are close to column A and buses are close to column B. The organizations' uncoordinated modal decisions produced a diversity which could well have been systematically beneficial given how little was known about passenger preferences.

This hedging is error-mitigating rather than error-correcting (see p. 4) since we assume that basic service strategy is a permanent feature of each system. If a service strategy is flawed it cannot be corrected, though its effects can be ameliorated. Thus if any service strategy mistakes were made, they justify a more permanent redundancy than do technical development problems which lessen over time.

It is difficult to measure the payoff redundancy has produced with respect to differentiated service strategies. One measure, ridership, crudely indicates that each system's set of attributes has appeal (AC and BART are still roughly splitting peak transbay ridership); neither set of design tradeoffs has proven clearly superior. But this revealed preference

Design Trade-offs and Compromise

SELECTED QUALITIES (A)	SACRIFICED OR COMPROMISED QUALITIES (B)
1. High average speed between stations, therefore widely spaced stations.	1. Closely spaced stations, therefore ease of access to stations.
2. Mainline system serving major traffic corridors.	2. Network of transit lines serving sub-areas of the region. Ability to complete trip in a single vehicle without having to transfer to and from feeder system.
3. Batch-type transport mode: cars in trains carrying many passengers.	3. Flow-type transport mode: smaller vehicles carrying comparable numbers of passengers at shorter headways, with branching local distribution at origin and destination.
4. Fixed rail on exclusive grade-separated right-of-way.	4. Flexible routing in response to changing travel patterns. Economy of construction. Right-of-way usable by other vehicles. Disabled vehicles do not disrupt operation of entire line.
5. Limited number of access points into system, to encourage clustered urban development.	5. Compatibility with foot-loose trends and low-density settlement patterns.
6. Frequent service with stops at all stations.	6. Differentiated service with both "local" and "express" operations.
7. High aesthetic and comfront standards.	7. Economy of construction.
8. Regional long-haul design.	8. Local trip-making capability.

Source: Webber, 1976, p. 100

approach is contaminated by price differentials and BART's short-term reliability problems. A second measure, survey data, might reveal more directly how actual or potential patrons view the system's attributes. I was surprised to find that in Michael Johnson's study of 258 potential transit commuters in the San Francisco-Oakland area, BART and AC did not score very differently on ten attributes such as total travel time, waiting time, and dependability. The difference between cars and the two public modes were generally larger than the differences between the transit alternatives (Johnson, 1975, p. 4). At this time, therefore, there is no strong evidence that the difference in service attributes is large enough to matter much.

(4) Future uncertainties. One function of multiple channels is to hedge against future problems or opportunities that are but dimly perceived now. A major long-run uncertainty is future travel patterns in the Bay Area. Although there are stable corridors (East Bay commuters funneling into downtown San Francisco), in several decades new mini-employment centers may appear elsewhere. Both BART and AC have rigidities which will inhibit them from adapting to unpredictable origin-destination changes. But so long as these rigidities are not correlated, the two together retain some flexibility. Although AC's current San Francisco terminal is near the edge of downtown, it is technologically able to shift with travel pattern changes. The buses of the Golden Gate Bridge, Highway and Transit District, for example, drop off and pick up commuters at several San Francisco locations, and technically AC could do likewise. There are, however, institutional and fiscal constraints. The City of San Francisco was reluctant to let the Golden Gate District's buses on its streets, and we may expect a similar reluctance before an AC request.

Besides, AC lacks Golden Gate's leverage. In addition AC, especially post-13, is reluctant to get on congested city streets and increase turn-around time for their peakhour buses (#3). BART, on the other hand, would incur formidable construction costs if it extended to growing employment centers--its technology is less flexible than AC's--but institutional constraints would be less binding.

(5) The rivalry effect. Chapter One predicted that competitive redundancies, in which organizations fight over scarce resources, would have effects beyond those of redundancy in general. These include using rival organizations as reference points, and consciously striving to outperform them via service improvements or price cuts. There is little evidence of a rivalry effect in the AC-BART relationship. AC's primary points of comparison were initially the Key System and subsequently itself. Longitudinal (historical) evaluation appears more important than cross-organizational comparison. Though during the 1970-72 transbay discussions AC frequently referred to comparative route times, there is no evidence that AC tried to improve its position vis-a-vis BART. The basic transbay lines, including self-feeding express buses, were established well before BART became a rival, and these routes, once settled, continued. As for BART, it could not easily use historical comparisons during its design phase (the Key System was too dissimilar), but in terms of service attributes the competitive standards were set by the auto (cf. 1956 Parsons, et al., Report, or Walter Douglas's speeches in the 1950's). During BART's early operation, internal problems such as reliability and safety provided sufficient room for improvement. Progress could be measured by the gap between system design and performance; an external performance standard (AC) was not needed.

In both agencies, then, history and internal dynamics swamped extra-organizational comparisons.

From the perspective of error-correction, one problem of historically-oriented agencies is that they find it difficult to change courses of action. Reversibility, a sine qua non of error-correction, is not readily obtained. How does this pertain to AC and BART?

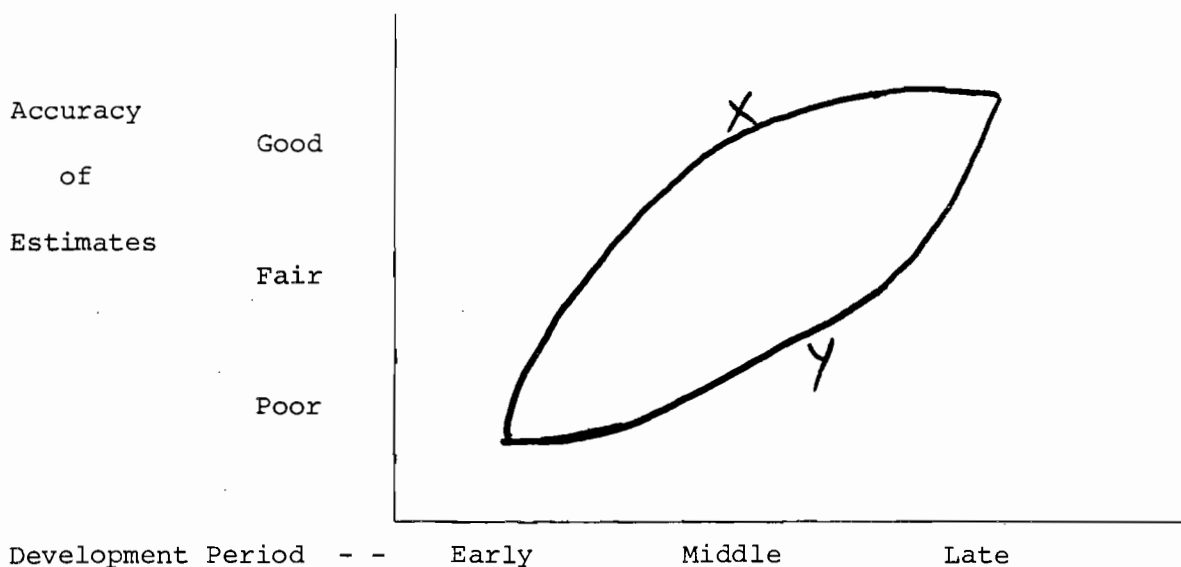
Reversibility and Operational Redundancy

Different degrees of capital intensity complicate the general theory of bureaucratic redundancy, especially Klein's version that analyzes the pruning of parallel development paths. Rail's massive sunk costs make, in the medium-term, only one-sided pruning politically feasible. If we regard AC and BART as competing developments, we can act on what we learn only if AC is found to be inferior. It seems that Klein, et al., studied only instances where alternatives were roughly equal in sunk costs and reversibility. Even the stopping rule problem noted by Armacost (Chapter One, footnote 20) applied to both missiles equally. But here the two alternatives do not have the same stopping point. AC's duplicate routes can be discontinued at any time (despite a hue and cry, which would probably subside as it has in Washington); BART's cannot.

Further, I think that Scherer's proposition (Chapter One, footnote 19) that the uncertainty regarding a system's utility and reliability is not reduced until late in development does apply to this case. It was not known until the early seventies that BART would suffer severe reliability and failure-management difficulties, nor do I think it likely that patronage predictions would have improved much between 1962 and 1973. Concerning these variable, we were on a y-curve. (Fig. 1). That is, the

accuracy of estimates of system performance do not improve until late in development. Consequently, even if the two projects had been run as parallel development paths, a central decisionmaker would have been hard-pressed to make a choice until BART was built and had operating experience. By that time the choice is (one-sidedly) irreversible.⁴² Hedging against error is more possible here than error-correcting.

Fig. 1



Conclusions

The advantages of operational redundancy accrue to the Bay Area alone. But if we can learn something from AC-BART interactions, this knowledge may have wider implications.

(1) Transit lessons. It is probable that few would have expected buses to fare so well against a modern rail system. Although no modal choice models predicted the outcome of a bus-rail competition,⁴³ I am convinced that a poll in the sixties of non-AC/BART officials would have heavily favored BART. The general consensus on buses was that they were

an unappealing mode with a dying future. And though the assessment of modal attractiveness is crude (merely based on the systems' patronage levels), the difference between prior expectations and the systems' track records is large.

The transit "experiment," however, is not yet over. BART's reliability is continuing to improve. If freeway congestion worsens significantly, then AC's schedule dependability will decline just as BART's improves. It will be interesting to observe the effect on patronage.

(2) Organizational lessons. (a) The first organizational point follows from the above point on expectations. Given the low regard in which buses were held, it is unlikely that an integrated transit agency, which perforce would have been a development agency, would have permitted competition between modes. (b) It is possible for independent public agencies to both compete and cooperate with each other. A Metropolitan Transit Authority is not a necessary institutional condition for operational coordination. However, that there is some interference between competition and cooperation is clear; precisely how much is uncertain. (c) Operational redundancy can ameliorate development debugging and episodic disturbances, but because of unequal sunk investments the local community can correct mistakes only under special conditions. (c) Operational competition between agencies is facilitated if their technologies differ, and if the difference permits easy interpretation of agencies' relations as complementary rather than redundant. However, these same technological differences can help agencies avoid competition during the planning stage.

In order to study a case in which agencies were unable to avoid competition during planning, we now proceed to Chapter Four for an exam-

ination of rivalry which arose between two regional agencies in Minneapolis-
St. Paul.

Footnotes

¹Note that the Alameda-Contra Costa Transit Committee "formed as an outgrowth of the seventy-six-day Key System Strike" (Adler, 1978, p. 26).

^{1a}The district was created as five counties in 1957; it was not reduced to three until the early sixties.

^{1b}That San Francisco was to be the center of BART was an important factor in differentiating the two systems, especially when one adds the fact that Oakland was to be the center of the East Bay system. The rivalry between the two cities impeded the formation of a more comprehensive, integrated transit authority (Adler, p. 18-20).

^{1c}Though some of the earliest plans in the late forties saw BART as an integrated, multimodal agency which operated local as well as mainline service (Adler, p. 20). Had this idea been pursued in the mid- and late-fifties, it would have undoubtedly caused great conflict with the AC coalition.

^{1d}Complementarity between the two systems was assumed by BART planners as early as 1956 (Adler, p. 31).

²It is irrelevant for our purposes whether this plan was the product of a tight Bechtel-led cabal or of a more loose coalition of central-city oriented businessmen who also tapped genuine support for transit among non-elites.

We should note, however, that the Office of Technology Assessment report asserts that "it is not appropriate to be critical of BART and its promoters for failing to study alternatives, as many current writers have been. They were not violating planning standards accepted at that time" (1976, p. 39).

The firm was sufficiently trusted by AC to be rehired in 1958 for more detailed system planning--which formed the structure of the AC system--so we can infer that their recommendations were not taken lightly.

AC was more cautious about promising anything regarding organizational merger (as contrasted with service integration). While testifying before the State Senate, AC attorney Nisbet said that merger should be permitted only if the voters of the two county district agreed. It is interesting--especially in the light of the Washington Metrobus experience--that Nisbet would not take as sufficient protection a guarantee that the level of service in the two counties would be maintained by the merged organization. He contended that the ". . .level of service is not a point on which you can devise any degree of certainty. It's something the board of the two county district will have to wrestle with. . ." (quoted in Adler, p. 39).

A copy of Hensel's statement is in BART's "AC liaison" file, but there is no comment on it, nor have I located any BART reaction.

Also note at this time that AC did not support BART in its 1962 bond election.

The vague words, "public convenience and necessity" are a standard phrase from days of regulation of private transit firms. Generally an organization which wished to supply a new competing service would have to show the regulator that public convenience or necessity required it.

⁸Again, I found no evidence of a BART reaction.

⁹Neither agency was ever in a position to employ a fourth strategy-- threats.

¹⁰Of course BART was interested in whether AC could be legally required to coordinate. In 1970, Director Silliman directed Dahms to review AC's legislative Act, and Dahms replied that he could not "find any reference in the act regarding mandatory coordination with BART. Further, I am advised by (chief counsel) Malcolm Barrett that he is unaware of any such provision."

¹¹The ineffectiveness of the meetings with respect to route duplication is mentioned in interviews #4, 6, 16, 22; in a letter from Stokes to Bingham (August 1970) and a memo by Henry Bain (January 1971).

¹²AC officials have mentioned to me that they thought that AC's no-transfer ride was another advantage, but I have not found any documentary evidence that this was mentioned during the debates.

¹³I think it is accurate to say that the agencies shared the goal, but their preference orderings were not identical.

¹⁴Several AC officials felt that they had more experience in transit than BART personnel, and believed that any sudden switch from one service to another was a mistake.

¹⁵See MTC's Transit Development Program for the SFBA, 1975-84, Chapter Three for evidence on this point.

¹⁶Even its formal power does not allow it to unilaterally decide on issues on which operators disagree. This authority had been in the original MTC Legislation, but the operators objected and the clause deleted (Jones, MTC: incremental planning. . .).

¹⁷I have been told that MTC served a useful role here because by

this time neither AC nor BART trusted each other to lead the project. (#5)

¹⁸A MTC interviewee said that they do not meet with AC and BART regularly now on coordination issues. Rather MTC comes in on issues AC and BART cannot settle themselves and on which the staff receives pressure from various publics via the commissioners (#7). The staff apparently would not autonomously put the issue on the agenda, and since there has been almost zero public attention on it since 1973, it stays off the agenda. Proposition 13 may change this.

¹⁹Assistant General Manager Dahms had warned the board in April 1974 that due to a car shortage there would be many standees during the peak; in August BART announced there would be twice as many people as seats.

²⁰Mergers can have other effects besides eliminating competition; they can provide economies of scale. But as BART and AC have different technologies, scale economies would be restricted to administration. Administration, however, is a fairly small proportion of a transit agency's budget, so the savings would have to be large to amount to much in absolute terms. See also the evidence presented in Chapter Five, p. 191.

²¹As far as I can tell from office memos and interviews. Of course privately it may have been raised more frequently.

²²Which he said his colleagues believed.

²³We can dismiss the possibility of a three-way merger for anything short of the very long-run. The organizational and political problems are formidable. The Muni is a PUC department, not a special district, so a city charter revision would be necessary. And it is unlikely that the East Bay counties would be interested in being saddled with Muni.

²⁴More precisely, while I think there is a greater chance that redundant routes would be eliminated by a merged organization than via a

treaty between independent ones, merger itself is not likely.

²⁵It is well known that BART predicted self-sufficiency; it is not well known that AC did as well.

²⁶This is not true with respect to pure public goods, for which by definition there are no nonusers.

²⁷Deleted.

²⁸Unfortunately I do not know how to estimate how many AC riders would switch to cars, how many to BART and carpools, and how many trips would be suppressed.

²⁹Further, although BART's peakhour capacity is not as strained as it was three years ago, the Concord line is still crowded. In the short-run, before these capacity constraints can be eased, the main advantage to BART from AC's discontinuing transbay lines would accrue outside the highest parts of the peaks.

³⁰Note that this would not be a cost of redundancy per se, but only of conflict-laden (competitive) redundancy.

³¹Some of the feeder disagreements arose, however, because the agencies have in part different clientele. Originally BART wanted AC to bend more lines to the stations, but AC staffers believed that in some cases doing so would inconvenience local patterns. This conflict would have arisen had AC and BART been completely disjointed, functionally.

³²I suspect that in private firms which compete and contract with each other, there are separate divisions which handle the different tasks. AC and BART are not large enough to have such independent divisions.

³³An MTC staffer, discussing this organization's passive role, stated that had AC done something "really atrocious," MTC would have stepped in (#7).

³⁴Mutual advertising is the exception that could become entangled

in questions of competition (why advertise for an organization which provides some of the same service you do?). And there were initially some conflicts (#17; memo from Mattson to Dahms, 1972). In the last few years, relations seem much improved. It was thought by both sides that the influence of the general managers was largely responsible.

³⁵In four of the ten cases, the agency representatives are relatively new and were not around when the early seventies' talks were taking place.

³⁶Deleted

³⁷Deleted

³⁸The mechanical failures are exacerbated by BART's failure-sensitivity (#41), e.g., there are not many sidetracks for disabled trains so problems tend to ramify through the system. It is interesting that the designed microworld of BART hardware was predicated on the inverse of Murphy's Law--nothing will go wrong--whereas the undesigned macro world of AC-BART relations was not.

³⁹Interestingly, Altshuler notes "Numerous studies have found that [reliability] is one of the very few most significant criteria influencing modal choice, yet a recent survey of transit travel forecasting methods found that it was not among the thirteen variables frequently utilized by transportation planning agencies" (1979, p. 115).

⁴⁰An evaluation based on BART letters to AC thanking it for competently executed substitute service.

⁴¹As indicated by board minutes.

⁴²Klein's rebuttal is that a developer who is interested in learning can find ways to transform indivisibilities into divisibilities, so he can get off a slow learning curve and onto a fast one. It must be acknow-

ledged that neither system is technically indivisible; many rail projects, e.g., Toronto, have been built incrementally. But had that been done: (1) it is improbable that parallel buses would have been run, so there still wouldn't have been parallel development paths; (2) even if there had been parallel express buses, it is not clear whether it would have been an accurate test of a rail system that could ultimately extend deep into San Francisco's downtown and much closer to East Bay homes; and (3) under what circumstances would a developer want to learn fast?

⁴³I understand that transportation planners are just beginning to develop models which distinguish between different public transit modes (#26); in the sixties this was well beyond the state of the art.

APPENDIX

A METHODOLOGICAL NOTE:

OPERATIONAL REDUNDANCY AND THE DEGREE OF INDEPENDENCE

One of the most important problems in transferring the concept of redundancy to the study of public organizations is establishing to what degree multiple channels are independent. Mere legal independence is not sufficient to guarantee that services are functionally independent. Though establishing independence in an open system can never be conclusive--it is always possible to discover a disturbance which disrupts both channels--one can run through a checklist of items which would indicate roughly the degree of inter-dependence. Without this, applying redundancy theory is no more than a verbal exercise.

(1) AC and BART's technological differences provide a basis for expecting that certain failures will not be correlated. First, the bus does not control its traffic environment; the train does. Worsening traffic congestion will therefore hinder the former but not the latter. Second, since the vehicles run on different rights-of-way, a vehicle breakdown on one cannot impair flow on the other. Third, the basic design principles underlying the only novel technical elements in either system, BART's control system, obviously differ from AC's manual control. Failure in the new control design will not be correlated with problems of

the older one. It is evident that inter-modal redundancy enhances independence more than intra-modal redundancy would.

(2) The systems did not open at the same time so there was no danger that both would be in the "shaking down" phase simultaneously. (Of course given AC's conservative technological choice, its shakedown was minimal.)

(3) Because the agencies have different union locals with different contract expiration dates, the probability of simultaneous system failures due to strikes is diminished.

(4) Partly diversified financial bases of support, property tax for AC and sales tax for BART, mean that fiscal shocks will not shake both equally.

(5) One can analyze how different AC and BART's service characteristics are in order to see how independent they are in terms of "demand failure", i.e., people not riding either mode for the same reason. Correlated reasons, such as the inconvenience of fixed routes, would indicate that the systems were not redundant (statistically independent) for a class of people.

With the exception of point (5), AC and BART seem a reasonably clear instance of independent channels. We will see it is more difficult to find indicators of independence in the planning competition case which follows.

What about the stability of independence? Organizations operating in the same domain tend to develop linkages and interdependencies. Indeed, AC and BART were expected to do so. It is therefore pertinent to ask whether statistical independence is a stable property. The answer is partly determined by the earlier discussion on the stability of com-

petition. AC has an incentive to maintain parallel routes. But that is a necessary, not a sufficient, condition for redundant and independent channels (i.e., if there are no channels which are functionally equivalent, one need not worry whether they are independent). Given parallelisms, some stability of statistical independence is guaranteed by the agencies' sunk investments in modal technologies. Interorganizational links cannot wipe out these enduring choices, and they probably are the major guarantor of stable independence. Finally, the independence of failure by strike is somewhat protected by socio-economic differences between the two union locals.

CHAPTER FOUR

Institutional and Policy Context

Minnesotans take planning seriously. Numerous residents of the Twin Cities area also take regionalism seriously. It was therefore not surprising that well before most metropolises in the United States began regional planning, Minneapolis-St. Paul established a Metropolitan Planning Commission in 1957. One of its assignments was to investigate and report on the transit situation.

This region had once boasted a fine network of streetcar lines. In several dubious¹ transactions during the fifties, the streetcars were sold and replaced by buses. As the streetcar network steadily contracted through the sixties, the buses did not fill the gaps. Indeed, Twin City Lines, by far the largest firm,² cut back on bus routes. Although the system was reasonably well-managed (equipment was maintained, schedules kept; #23), nevertheless contracting system size and increasing equipment age contributed to the classic, though less steep, downward spiral of urban transit. Bulking larger than this trend was auto-and-highway-based growth of the region following World War II. Unlike older eastern cities, this metropolis experienced its greatest growth spurt in the post-auto era, particularly after World War II: the

population rose from 940,000 in 1949 to 1,874,000 in 1970. The auto's impact on development is revealed by growth dispersion. Though the central cities have stabilized following World War II, the suburbs picked up nearly all the 900,000-person increase. Employment centers also scattered. Obviously transit suffered in this environment, and the proportion of worktrips carried by transit fell considerably.

The Planning Commission, charged with investigating the problem, had its work cut out. In a set of studies (The Joint Program) done with the Minnesota Highway Department, the Planning Commission investigated both land use and transit possibilities. The Joint Program produced three alternative development scenarios: (1) classical central city with radial corridors; (2) "spread city," a dispersed pattern; (3) "constellation cities," wherein growth outside the central cities would be clustered in activity centers. Constellation cities received the most political support (#12), and was duly adopted by the Planning Commission in 1967.

Transit, which was supposed to be consistent with the recommended development pattern, had proved more troublesome. The Joint Program had hired DeLeuw, Cather & Co. in 1964 to advise on long-range transit possibilities, within the set of conventional (rapid rail and bus) alternatives. In order to forecast patronage, DeLeuw used data from a 1958 Highway Department study, and modified those data by assuming the radial corridors plan would be in effect. The consultants concluded that, even assuming the downtown-oriented corridors plan, travel demand would continue to be too light to warrant rapid rail. (The estimated maximum peak hour load in the year 2000 was 4,200 passengers.) DeLeuw recommended an express bus system as more compatible with Twin

City density and travel demands.

The Joint Program did not adopt the report. Although the Program agreed with its consultants that the area did not have the density to support rapid rail, it found buses also unappealing because of their fixed routes, slow speeds, and high operating costs (Joint Program "Notes," March 1967). Even then there was considerable interest in advanced technology, small vehicle systems, and the Joint Program formalized its interest in Policy Eight of its Metropolitan Development Guide:

Encourage the development of a new form of rapid transit system more specifically tailored to the needs of the Twin City area than conventional bus or rail rapid transit systems (p. 26).

But the Planning Commission could not realize either its chosen development or transit options. It was a voluntary federation with no implementing or fiscal authority. Its legacy to the forthcoming regional authorities were plans and personnel, not policies-in-force.

Concern for transit problems in the state Legislature, which could have created a more authoritative public organization for solving transit problems, was low in the mid-sixties. Apart from one or two influential legislators, the Legislature was more concerned with another regional issue, sewers. That was a difficult political problem, involving hot questions of finance, location, and timing; legislators were eager to be rid of it. In the 1967⁴ session the Legislature established a regional council and gave it sufficient authority to deal with the sewers problem. Although the Metro Council was created as a multi-purpose agency, all participants understood that its first

responsibility was to solve the sewerage issue (#24).

At the same session, backers of a public takeover of urban transit had written a bill that would create a single-purpose regional agency, the Metropolitan Transit Commission (MTC). If the bill passed, the Transit Commission would receive authority to do both short-term and long-term planning. The bill's key section, though ambiguous regarding division-of-labor, does indicate that the Commission was obliged to create a long-range plan:

The commission, with the cooperation of the Twin Cities metropolitan planning commission or its successor in authority and the department of highways, shall develop a plan for a complete, integrated mass transit system . . . so designed as in the judgement of the commission to best fit the needs of the area (473A.06).

It was not certain in 1967 that either bill would be approved; it was conceivable that the Legislature would create neither⁵ a Council nor a Transit Commission.⁶ It was probably at this point that a latent redundancy of authority was built into the charter legislation of the two regional bodies. Possibly public transit advocates, fearing the Transit Commission bill would fail, helped draft the Council's bill to give it the apparent authority to conduct overall transportation and transit planning.

The metropolitan council shall prepare and adopt . . . a comprehensive development guide for the metropolitan area. It shall consist of a compilation of policy statements, goals, standards, programs, and maps prescribing guides for an orderly and economic development, public and private, of the metropolitan area. The comprehensive development guide shall recognize and encompass those future developments which will have an impact on the entire area including but not limited to such matters as land

use . . . the necessity for and location of airports, highways, transit facilities . . . (Section 6, subdivision 5).

Exactly what a "compilation of policy statements, goals, standards, programs, and maps prescribing guides" meant the Legislature did not specify. In particular, it was unclear how much the Council could constrain the selection of a transit mode by enumerating goals, programs, and necessity for and location of transit facilities. As the legitimate scope of the Council's transportation planning was inexact, so the Legislature's intended relation between future MTC and Council planning was uncertain. The ambiguous relationship became more than an academic point when, to the surprise of many legislative observers, both bills became law.

Although the division of planning responsibilities was uncertain, it was clear that the Legislature intended the two new agencies to be related hierarchically. The 1967 Legislation gave the Council authority to review all long-term comprehensive plans of the specialized commissions and to direct that a plan be "indefinitely suspended" (Section 6, subdivision 6). (The commissions had the right to appeal a decision before the entire Council. If agreement could not be reached, the matter would be brought before the Legislature. This arbitration clause proved significant.⁷) In the confident words of a founding Councillor, "there was no doubt [that] we were the system planners" (#24). As a multifunctional agency charged with overseeing special purpose ones (the Airports Commission, the Waste Commission, and the Parks and Open Space Commission, in addition to the Transit Commission), the Council was supposed to coordinate regional activities in accord with its Metro

Development Guide. The law required actions of special purpose agencies to be consistent with the Guide. Unlike AC and BART's relation, there was a definite hierarchical component in the Transit Commission-Council relation, at least legally. I stress the qualification because it is well-known how many regional coordinating authorities have real authority over little and coordinate less.⁸ The Council's legal powers represented only potential; it had to prove itself in the late sixties by handling its first assigned problem.

(As we shall see shortly, the hierarchical arrangement could have enabled a conventional, nonredundant relation to evolve between the Council and the MTC. The latter would then have generated proposals that the former would have reviewed.⁹ Differentiation is ordinarily conceived of horizontally, but hierarchy is a division of labor as well.)

The Quiet Years: 1968-70

The latent overlap between the Council and MTC was not activated for the first four years of the agencies' existence. There was a de facto division of labor and attention. This differentiation was not based on an agreement, even a tacit one. Rather, the Council, preoccupied with sewers, gave transportation low priority (#12), while the more specialized MTC began short-range bus improvement studies in 1968 and long-range system planning in 1969. Although Council staff was involved--to what degree is unclear--in consultant selection and sat in MTC planning sessions, the Council seemed content to let MTC lead the way in system planning. With no pressure from Councillors, their staff played a passive role.

Regarding jurisdictional relations, the MTC's legal position was strengthened in 1969 through more specification of its enabling legislation:

The commission shall have the power to plan, engineer, construct, equip, and operate transit systems, transit projects, or any parts thereof, including transit lanes or rights of way . . . or any other facilities useful for or related to any public transit system. (473A.05)

These are broad and general powers. In the same session, however, the Council secured greater authority over the Commission by receiving the right to approve or disapprove the latter's capital expense budget. So though the overlap ambiguities persisted, the relation's hierarchical component was clarified and strengthened.

Substantively, the modal choice process was murky. Transit planning in this region was not an easy task. MTC and Council staffs shared a belief that the region, though crisscrossed by extensive, high-quality highways, needed some kind of mass transit (#36). The auto-highway system would not suffice. But which kind of transit was appropriate for the Twin Cities' moderate density? In order to answer the question, MTC hired Voorhees as its first long-range planning consultant. The Voorhees group, after evaluating numerous alternatives,¹⁰ recommended fixed rail of conventional technology over either buses or advanced-technology fixed-guideway systems suggested by the Joint Program. The recommendation was not lightly made; the Voorhees report was the least optimistic of MTC's long-range plans, and recounted soberly the difficulties that any kind of transit would have in the Twin Cities area (Vol. 3, p. 43-55). Although its patronage predictions were higher

than DeLeuw's, it nevertheless predicted that only on the five major corridors would volumes exceed 5,000 passengers hourly by 1985 (ibid., p. 128). Its claims about the impact of rail on variables such as auto-induced air pollution, reducing the need for new highways, and shaping development were modest, though not insignificant (ibid., p. 43, 54, 60, respectively).

The report recommended that the region not construct the system all at once, but do it in stages because corridor densities differed so greatly. This was politically naive (as was the report generally; #12). When the report was revealed, the newspapers and City of St. Paul reacted negatively, their dissatisfactions focused mostly on the staging sequence (Dispatch, 1/9/70; Star, 3/3/70; 4/12/70). John Jamieson, head of long-range planning, replied that the agency would reassess the staging sequence (Dispatch, 1/28/70), and Chairman Bolstad commented that it was an engineering report only.

Following the Voorhees report disagreements surfaced inside MTC as well. The differences concerned not staging but technology. Although no one was thinking of express buses as a long-term choice (#23, 37)--that was seen as strictly a short-term solution--the commissioners disagreed over which kind of fixed guideway was preferable. Several, including the chairman, favored a relatively conventional (though possibly automated) scaled-down rapid rail. Two others had been contacted by Edward Anderson, a University of Minnesota engineering professor investigating Personal Rapid Transit (PRT). They were sufficiently impressed to advocate that alternative, despite the Voorhees report's warning that such systems were as yet too far from operational to offer a current option. The divisions within MTC were

so great that the executive director, John Doolittle, resigned in June 1970 amidst speculations that the agency's indecisiveness was a factor in his resignation (Star, 6/6/70). Doolittle's departure was followed shortly by that of a high level long-range planner, Manuel Padron, who cited similar reasons (Tribune, 6/11/70).

Although the board was divided, the staff was not. The preferred mode in the long-range planning section was conventional (though automated and scaled-down) rapid rail. The section's head, John Jamieson, had told the St. Paul Dispatch, over a year before joining MTC, that he thought subways should ultimately provide the backbone for mass transit (12/20/67), and it seems his vision never wavered. (It is difficult to know whether there was consensus among the long-range planners or whether only Jamieson's opinion counted. Outsiders, such as Council staff, were acquainted primarily with Jamieson's views (#35). If there were any disagreements within that section, they did not surface outside the organization, or even to the MTC board.)

There was some tension between Jamieson and the commissioners interested in advanced technology. The commissioners believed that PRT was not receiving a fair hearing and that they were being given not alternatives, but a fait accompli. Nevertheless, there was not much they could do. Their primary source of information was the long-range planning staff and consultants who worked, by all accounts, closely with staff.

There may have been potential for bus advocacy to emerge from the short-range planners who were improving the bus system. But a clear division of labor was maintained between short-term and long-term

planners. They were viewed as complements rather than as potential substitutes, which no doubt reduced intraorganizational conflict. There is no evidence that the short-term planners ever attempted to intervene in long-term planning as bus advocates.

At this time MTC's intraorganizational modal divisions were more pronounced than those between MTC and the Council. As mentioned above, Council staff was not yet taking an active role. In addition, the head of the Council's transportation staff, despite a highway background, was not unfavorably inclined to a fixed-guideway alternative (#36), as was the Council's chief planner (#9, 12).

The basis for the agencies' rough-and-ready consensus in the late sixties was twofold. First, Council Staff believed that if transit were to help shape development, and not merely respond to it, then the choice had to be a fixed-guideway system; buses were clearly inadequate (#35). On this the agencies agreed. And at this time the region's population was projected to grow sufficiently in the next three decades to provide the demographic prerequisite for shaping development.¹¹ Second, it is likely, although such points are hard to pin down, the image of a mass transit system connoted fixed-guideways to both staffs and excluded an expanded bus system as a longterm alternative (#35). This kind of implicit preconception might have guided the early, fundamental choices.

Council-MTC consensus reached its peak in February 1970, when the two staffs issued "A Joint MTC-Metro Council Staff Conclusion" on transit planning. The document's central point was that the long-range transit system should be based on a "family of vehicles" concept. Precisely what this concept implied, and therefore what the agencies were committing

themselves to, was interpreted differently by different interviewees.

One interpretation was quite specific: urban transit performs several functions (collection, longhaul, and distribution), and different vehicles are appropriate for different functions. Further, for the longhaul function in congested corridors an unspecified kind of fixed-guideway is needed. This interpretation is supported by the following statement from the document:

Four subsystems will be necessary. . . . The subsystems include:

- 1) Rapid transit operating on exclusive right-of-way to provide a highly automated backbone to the system for schedule reliability and rapid movement.
- 2) Express bus fills the continuing need to provide rapid service on low volume trunklines. . . . (p. 2)

It seems clear that (1) and (2) eliminated an all-bus option. By specializing vehicles to transit function (rapid transit for longhaul, other vehicles for collection and distribution), Council staff was agreeing to eliminate any advanced technology system in which one vehicle served all functions (for example, a fine grain PRT; see p. 5 of document). It is therefore fair to conclude that at this time the family-of-vehicles concept was rather specific and did constitute a fundamental choice among technologies.

The second interpretation was that the family-of-vehicles proposal was, as one interviewee said, "a classic copout" which merely pointed to the variety of functions performed by metropolitan transit, but which left open the choice of hardware. This interpretation means that the family-of-vehicles idea would have left the fundamental choices unresolved. Indeed, several officials attributed to this ambiguity the

critical function of creating the appearance of agreement despite underlying differences (#12, 22). This interpretation, of course, would have committed the Council to very little.

The above document quotations do not bear out this interpretation of early 1970 staff agreements. As we shall see shortly, however, the agreement which was incorporated into the Council's transportation chapter of its Metropolitan Development Guide was more vague and somewhat closer to the second interpretation.

It is well to bear in mind that, regardless of how definitive an agreement the joint-staff conclusion was, it was substantive only. It did not address the question of jurisdictional overlap, unlike the AC-BART tacit agreement in the late fifties which seemed to settle on a division of labor. The door was still open for the Council to become more deeply involved in system planning.

Complementary Planning

Throughout this period the potential for a nonoverlapping division of labor lay in the land use-transit relation. The Council had exclusive authority to conduct land use planning. Had it adopted a definite land use plan, it could have required MTC's transit plan to be consistent with it. This would have produced conventional, hierarchical specialization: the subordinate generates alternatives that the superior tests. Council staff, however, disagreed over how much constraint a land use plan would have exerted. The former chief planner thought it would have selective force, but a former chief of transportation planning held that:

. . . in a heated, long-term process, that strategy becomes very difficult. A guy comes back with a consultant who says, yes, this alternative is consistent with the development plan. It becomes wishy-washy, the facts in no way clear for decision-maker. Then no one wants to talk about land use decisions, and it will become a question of one guy saying, build the system and another guy saying, like hell (14).

Regardless of who was right, the Council at this time could not agree on a land use plan, at least not one which implied a definite transit policy. The legacy of the old metro planning commission was the Constellation Cities approach, but the Council was not bound to accept that as its own. While "Constellation Cities" did find its way into the Council's 1971 Development Guide (renamed Major Diversified Centers) the Council was not sufficiently committed to it to implement it. Rather, it was content to view it as a pattern that was emerging from private sector decisions (major retailers' location decisions and so forth). Because there was disagreement over the desirability of alternative development paths, it was easiest to adopt the path that required little action by the Council. And as the major diversified center was a compromise between the extremes of "spread city" and "radial city," its relation to transit plans was hazier than those of the other two. Spread city would clearly have entailed a continued commitment to highways, radial city to rail. But what followed from a constellation cities plan was not so obvious.¹²

The lack of a clear signal from the Council constituted a problem for MTC. Its long-range plan was required to be consistent with the Council's development assumptions, so obviously some land use assumptions had to be incorporated as decision premises. It was therefore reasonable for the first two long-range plans to assume that

the constellation cities approach was a firm Council decision; after all, there was little else to go on. Despite occasional intra-MTC grumblings, it was not difficult to argue that a transit plan that had a fixed guideway as its backbone was consistent with the land use assumption. Transit stations could help cluster growth around major diversified centers, and the fast link guideway provided access between centers (Daniel et al., Report No. 1, p. 17).

The agencies' formal hierarchical relation was confused by a perceived relation between land use patterns and transit. Going back at least as far as the old metro planning commission, Twin City planners had posited a reciprocal causality between land use and transportation (Joint Program, Development Guide, p. 6). Land use affected demand for transportation, but transportation in turn affected land values and use. A hierarchy of authority, on the other hand, ordinarily presupposes a recursive or one-way causality in which goals determine means. In this relation one adapts means to ends. But in reciprocal causation, there is no obvious causal ordering; one could make decisions on either transportation or land use and require the second variable to be consistent with determinations made on the first. If, as seems to be true in this case, land use planning is "softer" than transportation planning, then transportation planners will tend to believe that land use should be made consistent with their choices. And technically, this is reasonable because of the postulated causal reciprocity.

The Second Round of Transit Planning

Though the Council had not criticized the Voorhees plan, there were sufficient external, as well as internal, criticisms of it to

warrant a new plan and new consultants. MTC hired Daniel, Mann, Johnson, and Mendenhall (DMJM) with Midwest Research Associates in 1970, and instructed them to reanalyze advanced technology fixed-guideways as well as rapid rail. Furthermore, the consultants were not to recommend technology for the trunkline (Tribune, 5/14/70).

DMJM followed the instructions and maintained that "no vehicle system selection is intended or implied in this report" (Report #1, p. 25). Such conclusions, however, could be drawn without difficulty from their modal evaluations. Bus systems fared badly against technologically unspecified fixed-guideway systems in the cost-benefit analysis (Report 7). Within the class of fixed-guideway systems, the report was more cautious. It did, however, point out that PRT-type systems would require major expenditures in both time and money by the Federal government and the private sector to be made feasible (Transit Options, p. 20)-- a point verified by subsequent investigations. The report noted in contrast that approaches such as scaling down equipment similar to BART's, using an existing medium-capacity system such as the Westinghouse Sky-Bus, or starting a joint cities effort to develop a standard system for medium-size cities were practical at that time.

1971--Year of Transition

1971 Legislative Session

The DMJM report was, as intended, completed in time for the 1971 legislative session. Chairman Bolstad and his staff had originally wished to recommend a firm long-range plan to the Legislature and to receive preliminary engineering approval. But there were too many

obstacles for this to be accomplished. First, the MTC board was itself too deeply divided to make a firm recommendation on technology. Second, some legislators had become interested in advanced technologies (a small PRT study would be financed in this session). Third, although the Council was still going along with the family-of-vehicles concept, its meaning had been diluted in the transportation chapter of the Metropolitan Development Guide that the Council adopted in February 1971. The chapter did not mention fixed-guideways, but only "fast-link high-speed transit supported by local and feeder lines." This phrase provided a wedge for advanced technologies. Further, the chapter added that

This new transit service may run on its exclusive right-of-way, but opportunity to use existing transportation routes such as highways with exclusive bus routes or operational priority should also be examined and adopted if they improve transit service (p. 14).

This provided a wedge for buses.

It was impossible in this climate of opinion for the chairman to tell the Legislature that MTC had made a definite system selection. In the January 1971 booklet, Transit in Transportation, which was used for lobbying, the technology issue was finessed:

It is the intent of the Commission to utilize the latest technology available. The transit planning accomplished to date by the Commission does not preclude the use of small vehicles in fast link corridors (p. 18).

Bolstad reluctantly decided to emphasize the short-range bus-improvement

plan (MTC had just taken over the private bus firm in 1970) and to be content with merely keeping up momentum for the long-range by getting funds for more detailed planning, rather than funds for preliminary engineering. Although the staff was dissatisfied, still another high official (the public relations director) leaving in May and citing reasons similar to Padrone's (Dispatch, 5/19/71), it is doubtful that more could have been obtained. The time was not yet right, as one official put it, to "talk about steel wheels on steel rails" (#23).

Governor Anderson's election in 1970 had set the stage for the transition year of 1971. He appointed new chairmen of the Council and MTC, Al Hofstede and Doug Kelm, respectively, and several new Councillors. More than personnel was changing: the Council's agenda was shifting. The Council had successfully brokered the sewer problem in 1969-70 and its attention was turning to new, large, lumpy investment issues, particularly airport and transit. Even before Hofstede took the chair, his predecessor, James Hetland, and several influential and allied Citizens' Leaguers¹³ had voiced concern that the Council was going to lose its role as development shaper, that development would become a by-product of decisions made by special purpose commissions such as the Airport and Transit Commissions.

Accordingly the Council attempted to bind the MTC more tightly to it, following what was known as the Sewer Board model (since 1969 the Council appointed the Sewer Board members and approved its annual budget). The Council succeeded in obtaining legislation which directed that

The metropolitan transit commission shall implement the

transit elements of the transportation development program as adopted by the metropolitan council as a part of its development guide. . . . No portion of the public or mass transit system shall be acquired, constructed, or reconstructed in the metropolitan area except in accordance with the Council's plan (473A.065).

This once again strengthened the Council's authority without clarifying precisely what was to be in the MTC's plan and what was to be in the Council's transportation development program.

The jurisdictional overlap and dispute that began in 1972 might have been avoided had the Council gotten its entire 1971 legislative package approved, because that package included power to appoint MTC Commissioners. The Council could then have appointed Commissioners who would have been sympathetic to the transit views of its Development Guide Committee (see below, p. 152). This power, however, was denied by the Legislature.¹⁴

Concern that the Council was being "pre-empted" continued in the new Council. Its institutional position was not yet secure, and its authority was again seen to rest on whether it could make authoritative decisions on major upcoming issues (#4). Hofstede's assignment of the important Development Guide Committee chairmanship to new Councilor David Graven, known for his energy, signalled in late 1971 that the Council would probably shed its passive role in transit planning. The personnel turnover further freed the Council's hand. Whatever the January 1971 joint staff conclusion meant, it had not been written during Graven's tenure, and he felt it did not bind the Council. But it does not appear that the Council had strong modal predilections in 1971. Institutional concerns of Council leaders, rather than technical

concerns of Council staffers, were the primary stimuli for involvement in transit planning.¹⁵

At the same time that Graven was taking over the Development Guide Committee, an equally energetic official, Doug Kelm, was assuming MTC's chairmanship. Kelm was regarded by others and by himself as too much of an activist merely to sit back and take over a bus company (Twin City Lines was bought out in 1970). Though unlike Jamieson he had not evinced early partiality toward any one transit mode, Kelm had been involved in transportation controversies before, having led one of the early anti-freeway fights in the Twin Cities region. The need to rely less on autos and freeways and more on transit had become part of his credo. Further, he was concerned about land use development, having been a subcommittee chairman of the metro planning commission in the sixties.¹⁶ Kelm's interest in shaping development nicely complemented Jamieson's (his chief planner) advocacy of a rail backbone system; they worked well as a team. Given that relationship, given that MTC had already completed two lengthy studies which directly or indirectly recommended rail, given that Kelm felt that "the time for planning is over; it is time for action," it is not surprising that he became a rail supporter. He had no outstanding reason to doubt the conclusions of the reports which his more knowledgeable colleague had supervised. Moreover, they prepared the way for the preliminary engineering stage.

When Kelm joined MTC, it was still divided between advanced technology (PRT) and conventional rail advocates. The resignation of the two strongest Personal Rapid Transit advocates in 1971 gave Kelm the opportunity to pull the board together.

And as Kelm was made full-time chairman in 1972 (all other Commissioners being part-time), his importance and influence on modal choice increased. For the critical next four years, internal MTC board conflicts receded, and we can treat the organization as a unified agency.¹⁷

1972: Parallel Planning

Though Graven had stated in late 1971 that he believed there was a leadership vacuum in transit planning, that MTC was too divided to reach a decision, by January, 1972, he was more concerned that MTC was prematurely discarding certain options. Graven believed that "Ed Anderson had polarized the issue between fuddy duddies and new technology," which dissatisfied him because he thought that PRT "was not going to make it." That by elimination would have made MTC's rail system the choice.¹⁸ The Council would have then been forced to decide without thinking through the choice's implications, which would have weakened its authority.

The Development Guide Committee, therefore, in order to slow down planning, directed MTC to include a busways alternative in its third long-range plan (to be conducted by Simpson-Curtin) before going to the 1973 Legislature for preliminary engineering approval. MTC agreed reluctantly, arguing that option had already been studied by Voorhees and found wanting. MTC leadership undoubtedly felt this to be an unwarranted interference in their technical domain (#3, 5). As a shrewd observer remarked, "The Council couldn't really expect MTC to just sweep all those plans, time, etc., into the wastebasket. That's not

how things work" (#1). Nevertheless, by March MTC had fulfilled the Council's request by including the busway alternative in the Simpson-Curtin study.

Meanwhile, Council staff was gearing up to draft a new transportation chapter of the Metropolitan Development Guide. Transit was made top priority in the chapter (staff memo, January 5). The heart of the emerging functional overlap lay in this preparation of the transportation chapter. Transportation planning necessarily included transit planning, but at what level of specificity the Councillors themselves did not know. One Councillor told me, "It was not clear whether we were supposed to do transportation planning . . . what the hell, try it and see if anyone salutes. We started doing it, and people believed we were doing it, so we were doing it" (#4).

At this time some Council staffers were still sympathetic to the family-of-vehicles concept (op. cit., memo, p. 3). However, their suggested list of major alternatives for the Guide Committee's consideration nearly reproduced the range of options that MTC and Voorhees had already analyzed in 1969. There were five kinds of bus systems and four kinds of fixed guideway alternatives ranging from "reduced rail" (similar to MTC's recommendation of later that year) to Personal Rapid Transit. It appears clear from this choice set that the staff was instructed to take neither the earlier MTC studies nor the joint agency staff statement as starting places. This point was reinforced by a memo from the Guide Committee to the whole Council in late January. The memo posed two questions: "(1) What did we commit ourselves to? (2) Whatever we committed ourselves to in July, do we still want it in January?"¹⁹

Graven hoped the answers would emerge by addressing a set of questions drafted in February. The questions were intended to be at a generalist's level, i.e., to avoid discussing hardware, but rather to ask what should transit's functions be, and what they expected any transit system to accomplish. Thus the Committee, or at least Graven, did not see themselves as doing redundant planning; they were asking the kind of questions that a general purpose agency should ask, including many MTC was believed to be skirting. But even at this point Councillors and staff started probing into questions of technology and substantive alternatives, and not only generalist's questions. All through this and the succeeding year there was an uneasy tension between the Council's stance of a generalist asking policy questions and its position as an advocate of a specific modal alternative.

Probably to avoid being dependent upon MTC, the Guide Committee sought outside sources of information as it moved through the staff's schedule of questions. In addition to hearing academics²⁰ such as Alan Altshuler and Anthony Downs, the Committee decided it needed its own consultants and hired Barton-Aschman. The consultants produced the final plan in spring, 1972. It was not clear whether their report, "Feasibility of a Low Risk, Incremental Investment Strategy," was a guide to transit investment, therefore within a generalist agency's jurisdiction, or whether it was a modal (busways) plan. MTC officials saw it as the latter (#3, 5)--and a poor one at that. Newspapers also tended to regard it as a specific modal alternative to MTC's selection. But a former Barton-Aschman consultant argued that

Our contract with the Council was not to design busways,
it never was. We were in to the contract three-quarters

of the way, the Council said, we understand the concept, but we got to have something . . . how are we going to go over to the legislature with a theory? . . . can't go up there with a concept against a fixed rail plan" (#18).

The strategy as he saw it ("Feasibility . . ." p. i) was to delay the technological choice by not committing the region to any large sunk investment. They justified the strategy by arguing that since "substantial technological advances" were anticipated in transit in the next several years it was premature to make a decision.²¹ Practically, however, that rationale did imply a modal choice, because a bus system was the only option that had the desired property of low sunk costs (not necessarily buses on busways, since ordinary express buses or buses on metered freeways would have had even lower capital costs).²² Furthermore, the six questions that the Council asked Barton-Aschman, and whose answers took up nearly all the report, referred exclusively to buses (not to an incremental investment strategy). Confusion concerning the report persisted because it was both a general strategy and a modal choice. This paralleled the confusion regarding the Council's role.

At any rate, Barton-Aschman contributed most to the Guide Committee's planning by convincing the Committee that a lower capital alternative was feasible. This was important because by spring 1972 many Committee members were beginning to believe that the region did not have the density to support a rail system, that capital costs would be prohibitive, and that labor savings from an automated rail system would be less than MTC expected (#4, 24). With the Barton-Aschman plan in hand, the Committee could favor some kind of transit as well as oppose MTC's alternative. In late July, the Committee voted 6-0-1 to recommend a busways-plus-freeways alternative to the Council as the

transportation chapter of the Development Guide.²³

MTC's plan, though it did not specify a vehicle, had made two crucial choices that distinguished it from Council and Personal Rapid Transit alternatives. First, it had retained the family-of-vehicles concept with a fixed-guideway backbone. This distinguished it from the Council, which by this time had abandoned the family-of-vehicles and was moving away from fixed-guideways. Second, one of MTC's policy guidelines was to use the "best available technology," which differentiated it from the PRT coalition.

The reaction to the Council's alternative was immediate and sometimes intense. The city governments of Minneapolis and St. Paul were displeased, as both favored rail. (Indeed, the Minneapolis staff had even created its own subway plan.) Other groups seemed at least as opposed to the number of freeway miles as to the choice of bus over rail (Metro Council, Transportation Planning Materials, Books 1 and 3). In general, the Council was now displaying more pessimism about what transit could do for the region than were MTC, city governments, and other rail advocates. The Council was not claiming that its transit selection would significantly affect congestion, pollution, or development; it denied that its or any other alternative could have such impacts.

The exchanges between the Council and MTC in August reveal the major agreements and disagreements between the agencies at this time. Agreement was obtained, as usual, on the short-range plan to expand and improve the bus system. This agreement extended beyond the agencies and reached their allies; bus improvement was generally uncontroversial then. During the year both sides had tried several times to stress the

plans' similarities and to minimize the differences, but the disagreements were too large to gloss over. MTC criticized the Council's plan for not addressing (1) operating costs of busways; (2) how busways would function in 'winter; and (3) how to distribute additional buses downtown. These were not trifles, and were all later acknowledged to be severe problems by one of the consultants (#18). One drawback of such a cheap plan was its failure to detail how the plan could be realized.²⁴

There were three major Council criticisms of MTC's plan: (1) The region's low density meant that patronage in the heaviest corridor was estimated by MTC consultants²⁵ to be only 16,000 passengers per hour.²⁶ (2) Capital costs were too high, especially given other larger investments the region was making or would shortly make. (3) The first two points together implied that the region would pay too much for too little: rail was not cost-effective. The Council argued that a billion dollars was too much to pay for increasing the proportion of trips made by transit from 4% to 8% (for a rebuttal see footnote 27). MTC's service strategy was mistaken. In order to compete with the auto, a similar transfer-free ride should be offered. The family-of-vehicles approach, as long as it connoted a different vehicle for every function, implied multiple transfers. These were the fundamental criticisms that would be exchanged in the next year and a half.²⁸

Conflict Resolution

As in the AC-BART case, each side tried to persuade the other to change. Bargaining or logrolling across unrelated issues did not occur. Compromise, seeking a middle ground between proposals, would have been difficult because of the technologies' discreteness, and was not tried.

Persuasion was no more successful here than in the Bay Area. From the summer of 1972 through the following years, at meetings on the Council transportation chapter, at Citizens' League gatherings, and at other interest groups' debates, representatives of the two agencies met and argued without noticeably diminishing the differences between them. As one Council staffer put it, "We were like two battleships firing at each other . . . traveling on parallel courses" (#17).

Why did persuasion produce so little convergence? First, lines were hardening. Each side was convinced, by late 1972, that its position was correct; consequently, there was an increasingly strong tendency to retain estimates which supported that position. A council staffer noted, referring to arguments over projected inflation of bus drivers' wages, that "it was patently obvious if we used their technical inputs, they'd win, and vice versa" (#17).

Second, there was some objective uncertainty surrounding several key projections, such as patronage estimates, cost inflation in construction, how much labor MTC's system would require, and how much transit could shape land use. Other important magnitudes, e.g., the amount of pollution a rail system would diminish in downtown, partly depended on uncertain variables in the first set (patronage, land use). These uncertainties made it easier for advocates to maintain their positions. And because these planning disagreements were not converted into experimental competition, following Klein's model of parallel development paths, the uncertainties were not resolved empirically.²⁹ The disagreements remained on paper.

Third, there were no established rules for resolving disagreements over factual estimates, or even an agreement that disputants should

stick to one point until it was hammered out. As one official observed, and as a legislator would later complain, the agencies often talked past each other. If one side made a telling point, the other side often raised a new issue rather than replying (#10). There was no referee³⁰ to ensure that the game was played reasonably, and the conflict was insufficiently institutionalized and involved too high stakes for internal norms to constrain behavior. Indeed, far from being an institutionalized conflict, MTC leaders were angry that competitive planning had occurred at all. One MTC official told me that the Commission was unpleasantly surprised to hear that the Council had developed an alternative plan (#5), implying the conflict was unexpected as well as uninstitutionalized. And whether or not MTC was actually surprised,³¹ it is clear that the leaders were angry. They believed that not only was the Council overstepping its jurisdiction, it was reversing its commitment to a family-of-vehicles as well.³² Strong words were exchanged in private (#4, 5).

MTC officials questioned the motives of Councillors and staff, suggesting that the highway lobby was really behind the opposition to MTC's rail plan. Councillors resented that charge (#10, 4). On the other side, some Councillors said harsh things about MTC's consultants and top staff, alleging that the former reported only what the latter wanted to hear.³³ These accusations angered MTC's leadership.

This personalizing of the conflict undoubtedly hardened the positions and made conflict resolution more difficult. In public Kelm urged the Council to stick to a differentiated role as plan-reviewer rather than a redundant role as plan-generator, arguing that

The review and approval function performed by the Metropolitan Council is a vital one, and it is important that

it be conducted by a staff and a council that did not participate in the specialized planning process. Otherwise, the review function could be merely a self serving justification of a prior decision by that same body (Kelm, 1973, p. 2).

I think that Kelm, an early supporter of the Council (see footnote 14) was sincerely suggesting an alternate conception of the proper inter-organizational relations. It was not only that the Council had opposed MTC's plan, but it had done so in a manner which he (and Jamieson) considered illegitimate, and that heated the conflict. It was unlikely, in these circumstances, that the agencies could have persuaded one another on technical grounds. (And the staffs were less insulated from top level acrimony than in the AC-BART case.)

Perhaps the conflict would have been less intense if the Council had eschewed redundant planning and criticized the rail plan on a complementary basis, e.g., on the basis of its land use policy. But in 1972 the Council still did not have a strong land use policy. There still was some board-level uneasiness about controlling development (Dispatch, January 21, 1972), and staff drafts of the transportation chapter which mentioned coordinating "compact development . . . with transportation" were expressing more a pious wish than a guiding rule. The only element of land use planning that did have an effect in 1972 was not a decision, but an estimate: population projections were revised sharply downward.

Other Decision Forums

Large public meetings are poor settings for resolving inter-organizational differences; the desire to save face is too strong. But

the agencies' heads were members of the same political party, and several had known each other before (#4). There seemed, therefore, to be ample opportunity for informal persuasion, which if successful would have averted the embarrassment of intra-party disagreements aired before the 1973 legislative session. Informal channels did not work, however. The Democrat Farm-Labor Party is large, diverse, and loosely connected; common membership is unlikely to overcome firmly held policy differences. One serious attempt was made to resolve the problems informally, but the get-together was a disaster that exacerbated the conflict (#4).

UMTA might have played an informal mediating role by indicating which alternative it favored. UMTA, however, stayed out of the contest. It consistently held that the region's governments must make the choice.

Finally, there was an alternative formal forum, the Transportation Planning Program (TPP), which is composed of regional and state transportation agencies and local jurisdictions. Since the TPP was established to coordinate its members' activities, and to make recommendations on the Council's transportation chapter of its Development Guide, formally it appeared a natural forum. But the TPP was a weak institution which no key member respected. Consequently, when it criticized an earlier draft of the Council's transportation chapter, the latter usually ignored it. It was increasingly evident that resolution would have to be achieved by the Legislature in the upcoming session.

Jurisdictional Perspectives in 1972

The legislation of 1967, 1969, and 1971 could neither prevent nor resolve the jurisdictional dispute over which agency was authorized to conduct long-range transit planning. Both sides could and did

resort to professional legal advice supporting their positions. The lawyer consulted by MTC replied that the 1971 amendments requiring the Commission to implement the Council's transportation development program only "conditioned the exercise" of MTC's authority to plan a transit system; they did not remove that authority. He further argued that not only did MTC have planning authority, no other body had jurisdiction (p. 4), i.e., there was no overlap. But whereas the lawyer could easily cite legal precedent to demonstrate that MTC was a legitimate planner, he did not even try to demonstrate that the Council had not been similarly authorized.³⁴

The Council, as noted above, had refused to review MTC's plan since "the MTC is legally directed to implement the Council's metropolitan development guide, thereby precluding the need and authority to produce an independent long-range 'transit development' program" (Graven quoted in Tribune, 2/2/73). In January 1973, its legal counsel advised that the Council could first review MTC's program "to determine what portions of it are outside the authority of the MTC and come within the planning authority of the Metro Council under section 473A.065" (letter B). Only then was the Council obliged to review the remainder of the plan to check for consistency with the development guide. The counsel submitted that, by virtue of 473A.065 and 473A.05, subdivision 10, only the Council could legitimately prepare a long-term plan on transportation and transit. By implication, therefore, the Council could deny substantive review. This counsel's reasoning concerning overlap appears similar to MTC's (see footnote 34): if the Council possesses long-term planning authority, then it must follow that no other agency could as well.

1973 Legislative Session

The 1973 session had the following context. (1) There was a more positive attitude toward mass transit than had prevailed in 1971. Many new liberal assemblymen, elected in 1972, were positively disposed toward transit, and there was a diffuse feeling that "something had to be done" about metropolitan transit (#19). In a poll taken in 1972, transit was clearly regarded as the leading issue deserving priority and more money. The time was ripe for legislative action on a transit bill. (2) The Legislature was not facing an ordinary yea-or-nay choice on a single alternative preferred by a single agency. (That, given the positive disposition, would have been the simplest situation.) It instead confronted an inter-agency conflict on two levels, substantive and jurisdictional. In addition, complicating the picture, a University of Minnesota group had completed a legislatively financed PRT study in time for the 1973 session.

(3) There was a contingency plan in the 1967 metro bills for dealing with this type of circumstance. The Legislature had designated itself the arbitrator should regional agencies fail to reach agreement. Organizationally, however, the Legislature was not well-equipped to manage the dispute. Transit was a relatively new issue, and the Legislature had not developed the small core of specialists which emerge around more repetitive problems such as taxes. Further, staff support was limited. At first, therefore, this was an extreme instance of technical subordinates competing before a lay superior.

The Legislature could choose to address either or both the substantive and procedural questions. Because the disagreement between

the agencies was so pointed, it was evident that a jurisdictional settlement favoring the Council would automatically determine a substantive choice, whereas a jurisdictional settlement favoring MTC, i.e., recognizing its right to submit a long-range plan to the Council, would not necessarily imply a substantive selection.

Moving procedurally would have enabled the Legislature to avoid entanglement in transit technicalities for which it was ill-prepared, but there was considerable internal interest in dealing directly with the substantive question.

The Substantive Debate

Both sides acknowledge that MTC's lobbying effort was more extensive, better organized, and generally better received, particularly in the House (#18, 19). The MTC tried to contact all members of the House metropolitan affairs committee, not just the subcommittees (#8). The Council failed to make their alternative attractive concerning either hardware or strategy (i.e. incremental investment).³⁵

The House moved swiftly to pass MTC's bill; so swiftly, in fact, that there was little debate (#15, 16, 19). One well-located representative³⁶ told me that, although the bill's author learned more about transit alternatives than any other representative, even he knew relatively little about them by time of passage. Though it is risky to infer how much the assemblymen knew when they voted, it is likely that the decision was made without careful scrutiny.

In the Senate the debate was more prolonged (#16, 19). This did not lead to a preference for the Council's plan: the committee chairman expressed dissatisfaction with busways early on (Tribune, 3/21/73), and

I found no evidence of any supporters of an all-bus system at this time. Nevertheless, interviewees on all sides agreed that had the Council not presented a plan,³⁷ MTC's bill would have passed both chambers. How can we explain this seeming inconsistency between the negative reaction to the Council's plan and its perceived impact?

First, we must remember that there were three proposals before the Senate--the two agencies' plus the Personal Rapid Transit plan. The latter drew the support of powerful Senate committee members. They believed that PRT promised a set of service attributes which could compete with the auto (Star, 11/2/73). But the PRT option alone would probably not have sufficed to delay the Legislature's decision on preliminary engineering. By 1973 PRT had little support inside the Council. Therefore if the Council had not produced its own alternative, it would not have advocated PRT but would have had to go before the Legislature with only a procedural claim, namely, that MTC should not have prepared a long-range plan. Given the widespread feeling that something had to be done for transit, there would have been strong pressure to approve the only governmentally backed alternative. Further, even if the Council had been able to criticize MTC's plan incisively, despite lacking an alternative to give direction, a "what-do-you-offer-instead?" rebuttal would have been most telling in that year.

I believe the Council's and Personal Rapid Transit alternatives were individually necessary and jointly sufficient to prevent an immediate approval of MTC's plan. The former established the framework of Legislature-as-arbitrator and selector of substantive alternatives by creating a conflict that could not be ignored. The latter sufficiently impressed Senators so they could say that they were for transit but not

yet for MTC's plan.

The Council and PRT alternatives were jointly powerful because they bracketed MTC's plan: PRT offered better service; the Council's plan offered lower fixed cost. Combined, they raised the aspirations of Senate decision-makers.³⁸ The MTC proposal simply did not look as good as it would have had it been presented by itself. The two plans combined in another way. They were more compatible with each other than either were with MTC's plan, and they would become still more so after the fixed-guideway portion of the Council's busway plan was discarded. Personal Rapid Transit advocates backed the Council's plan (#26) because it would not foreclose the possibility of an innovative fixed-guideway system, which MTC's fixed-guideway would almost certainly have done. In fact, one of the Council's arguments for its plan was that it would not eliminate to-be-developed options such as PRT.

Finally, there was one "sleeper" function served by the Council's plan: it provided an easily modified backup alternative when the disappointing news about PRT started trickling in. But I am getting ahead of the story here.

I must add that the conflicting plans affected specialist and non-specialist legislator differently. They seemed to confuse the latter (#8). But solons becoming transit specialists used the disagreements between the agencies to indicate questionable premises or estimates. (They did not use the conflict to produce their own estimates by e.g., averaging.) The most thorough example of this kind of cross-checking was a report written by Representative Tomlinson and Senator Milton, two MTC supporters. They systematically compared the two agencies' responses to twenty-six questions. Their analysis revealed, as redundancy theory

leads us to expect, neither agency's position was free of distortion. The Council, for example, took consultants' statements out of context and MTC's density argument was suspect. The important point is that at least the involved legislators were not ignorant of significant distortions. It was unlikely that the adversaries had missed a premise in the other's argument that was both vital and shaky.

After several weeks of intense discussion, the Senate committee decided not to decide. Personal Rapid Transit appeared too promising to overlook but too risky to propose without further investigation. Accordingly, the committee decided to conduct a post-session tour of cities to meet with transit experts who understood both conventional and advanced technology, and then to write a report for the 1974 session.³⁹ Leaders of the House and Senate committees met to resolve their differences; they were not able to do so, despite common membership in the Democrat Farm-Labor Party.⁴⁰

Jurisdictional Activity

The belief that something had to be done about metropolitan transit was matched by a belief that something had to be done about the organizational mess created by confusing laws.⁴¹ Indeed, opinion was probably more unified on the organizational issue. Representative Salchert, a staunch MTC ally, also cosponsored a bill establishing a metropolitan Transportation Board, with Council-appointed members. The Board would have supplanted MTC. Salchert stressed, however, that though the Council should control subordinate agencies, the Legislature should make a substantive transit decision in that session: "This has been studied to death. Let's do the job." The House leadership had managed

to partition the substantive and jurisdictional questions, and agreed to vote on both.

The Senate committee preferred to delay the substantive choice while pushing strongly to resolve the jurisdictional conflict. Senator Chenoweth's bill would also have given the Council appointive powers, placed MTC and the Airport Commission directly under the Council, and given the Council the long-range transportation planning function.⁴² He declared his intent to make the Council "the system planner," a more pro-Council position than the House bill. This difference was indicated when the Senate's jurisdictional dispute spilled over into the substantive debate. MTC spokesmen argued that Chenoweth's bill would involve the Council too deeply in operations. Senator Milton, strongest MTC supporter in the committee, pointedly inquired, "how specific and how detailed does [the bill] give the Metro Council the power to plan a transportation program?" (Tribune, 4/26/73). Milton feared the bill could eliminate the advocacy function of more independent agencies.

Extended debates between metropolitan agencies and internal committee differences prevented the Senate committee from (narrowly) recommending passage until late April. There also remained inter-chamber differences. The House bill would have made the Council elective; the Senate's would have kept it appointive. Chenoweth withdrew the bill late in the session--floor disagreements in the Senate having made passage appear unlikely--and the 1973 session ended with neither substantive resolution nor jurisdictional clarification.

1973-74 Interim

The initiative had now shifted to the Legislature. The interim enabled a few legislators to familiarize themselves with the details of the fixed-guideway alternatives. Their information sources broadened: one said that during the session his informational diet had been restricted to MTC, but during the interim he became omniverous.

Following the tour, the Senate subcommittee submitted a report in November 1973, which, although it rejected "pure," fine-grain PRT networks, recommended that MTC, under general Council direction, develop a plan "for an automated small vehicle fixed-guideway system for consideration by the Legislature." The system would be PRT-like in that it would be demand-activated with origin-to-destination service. The report recommended other measures, including accelerating the bus-improvement program and promoting low-cost options such as carpools and vanpools, but it was clear that the subcommittee's major interest was the small vehicle study.

The Low-Capital Coalition

The impressive capacity of the Twin Cities region to generate alternatives was not yet exhausted. While the Senate subcommittee was investigating advanced technology personal transit, three other institutions, the Citizens' League, the Council, and eventually (1975) the House, were groping toward an alternative far removed from Personal Rapid Transit in the technological spectrum--low capital, manually operated small vehicles.

The Citizens' League was the first major group to advocate the

idea that the region needed more effective management of existing transit capacity rather than additional capacity. In its March 1973 report, Building Incentives for Drivers to Ride, the League proposed a novel definition of transit: instead of signifying hardware (in particular certain large vehicles), transit "should mean riding with others, rather than driving alone, regardless of the type of vehicle" (1973, p. 2). Carpools, for example, would be regarded as transit. The report argued that regarding regional goals, such as decreasing air pollution downtown or reducing the need for more freeways, one should be indifferent between a former car driver riding in a public bus or private auto. The report seems not to have influenced many people in 1973, but in January 1974, the League issued another report pursuing the same theme.⁴³ By this time changes in the Council's direction reinforced the League.

The Council was aware that though the busways plan was unpopular, a plan to expand the bus system, minus the capital-intensive busways structure, elicited considerable approval. Consequently, the Council mentioned the idea of an expensive, exclusive right-of-way for buses less frequently; "it just fell by the wayside" (#15). The easy abandonment of that component indicated how peripheral it had been to their approach. Council strategy increasingly focused more on making do with the region's existing capacity than on any kind of hardware.

In addition, the Council's transportation staff was developing new positions, including that the route structure of both MTC's and the Council's first plan were excessively downtown oriented (#17). Origin-destination studies emphasized that only 15% of the worktrips were bound

for the two CBDs and 25% for the central cities (A Summary Report of Travel, 1974, p. 64), yet both plans were designed to serve this small clientele. Gradually, stimulated by the appointment of a new transportation director in late 1973, the Council moved away from a moderately capital intensive, downtown-oriented busways plan toward a much less capital intensive, subregional⁴⁴ bus system.

The 1974 Legislative Session

Substantive Issues

At the start of the 1974 session the chambers' leaders were still at loggerheads. Nothing had occurred in the interim, including the Senate tour, to reduce those differences. Because neither chamber could get its way by itself, a compromise package was proposed. 1) MTC would be charged with investigating a range of small vehicle systems, and comparing the results of that study with MTC's alternative (Intermediate Capacity Rapid Transit, or ICRT). After the second evaluation MTC would recommend the preferred alternative to the Legislature. 2) Simultaneously the ten-year bus-improvement program would be telescoped into three years. The second plank was non-problematic as, once again, short-range bus improvements encountered few hurdles. The oil shortage of 1973-74 had prepared the way for faster spending on transit, and improving the bus system more rapidly than early short-range plans had outlined was consistent with any of the long-range plans. Though bus improvement was (or would prove to be) the most dangerous alternative to MTC's fixed-guideway plans, it also greatly increased that organization's budget. MTC accepted it as second best.

The first plank was of course more difficult. MTC leadership believed it had already analyzed PRT systems adequately and was not keen on doing it again. Moreover, by this time a good deal of personal antipathy had arisen between Kelm and the primary PRT expert, Professor Ed Anderson (#25). Several key Senators, on the other hand, came back from their tour convinced that "the MTC proposal is dead" and were presumably uninterested in having MTC compare the preferred small vehicle system with MTC's rapid rail. But as the two sides needed each other to pass any bill, the compromise was effected and the bill passed in March.

MTC's credibility, however, concerning PRT had worn thin. Part of the bill, therefore, assigned the Council to serve in a general oversight capacity. The assignment did not necessarily indicate that the Council's credibility in general was held in higher regard by the Legislature, but on the specific issue of evaluating PRT it was considered less biased. Kelm had fervently opposed advanced technology; the Council, though unenthusiastic, had not vehemently opposed it.

Jurisdictional Decisions

In the Senate Chenoweth won over the last session's opposition by concessions that do not concern us. Within two months, the joint conference committee agreed on a compromise which gave the Council authority to appoint the eight MTC Commissioners, but the Governor would appoint the chairman. The bill sailed through both chambers, and after the Governor signed it the Metropolitan Reorganization Act became law. The core of the act, as it pertains to our problem of functional overlaps, concerned the planning relationship between the Council and MTC.

Legislators hailed the Reorganization Act as a great step in clarifying the relations, but when one inspects the bill one is hard pressed to find significant increases in clarity (i.e., differentiation of roles) over the 1971 statutes.

The 1971 amendments had directed the MTC to "implement the transit elements of the transportation development program as adopted by the metropolitan council." This was changed to read

The commission shall prepare and submit . . . a transportation development program, providing for the implementation of the policy plan adopted by the council The transportation development program shall also contain a description of the type of right of way or routes required; the type of transit service to be provided in each portion of the system; designation of transit mode . . . (473.411).

The 1971 law had already established a means-end relation between the two agencies: the Council was to provide general goals and criteria, and MTC was to supply the means. The ambiguity turned on the failure to agree how specific the criteria could be or, equivalently, what point on the means-end chain marked the boundaries between the organizations. The new law did not solve this problem. True, the new law was more specific regarding what constituted a transportation development program and a policy plan, but even this was insufficient. Compare the above definition of MTC's development program with the following description of what is to be included in the Council's policy plan:

- (b) A general description of the physical facilities and services to be developed by the metropolitan commission . . .
- (c) A statement as to the general location of physical facilities and service areas;
- (d) A general statement of timing and priorities in the

development by the metropolitan commission of those physical facilities . . .

- (e) A general statement on the level of public expenditure both capital and operating appropriate to the facilities and a statement of the relationship of the policy plan to other policy plans and chapters of the metro development guide (473.146).

Section (b) (and possibly also (c), (d), and (e)) is quite elastic and could easily spill over into tasks included under MTC's development program. Precisely this occurred, over bitter but ineffectual protests of the Transit Commission.

There were, however, four changes not merely in wording but in substance, which did convey legislative intent. First, the Council was given authority to approve or disapprove the all-important capital budget of the Commission. Second, Commission revenue bonds also had to have Council approval. These fiscal powers added teeth to the still vague language describing the policy-making and implementing relation between the two bodies. Third, the legislative arbitration proviso was removed. Henceforth, if the Council refused to approve a plan, the special purpose agency would have to revise it. No formal⁴⁵ clause encouraged bypassing the Council.⁴⁶ Fourth, the Council would appoint all commissioners except MTC's chairman, considered the "ultimate signal" of legislative intent by one veteran observer (#33). Taken jointly, these four changes communicated the Legislature's intention to strengthen the Council vis-a-vis the single purpose agencies.

The Reorganization Act did not, however, immediately and directly affect transit planning in 1974-75 for several reasons. (1) All MTC Commissioners, including Kelm's supporters, had several years to go. In 1977 the Legislature would indicate continued displeasure with the rail

faction by abruptly shortening the terms of four Commissioners, allowing the Council to appoint four new ones of its own liking.⁴⁷ But in 1974, when the major policy controversy was proceeding, this penultimate sign from the Legislature was several years away. (2) MTC's primary task in the 1974-75 interim was to conduct a small vehicle study, compare the selected small vehicle with its more standard rapid rail, and recommend a final selection to the Legislature. This process was to be handled in a manner prescribed by law, but not by the Reorganization Act. The drama was largely completed in the 1975 session without the Act having had a significant impact, save one: the Council was doubtlessly heartened by the bill's enactment. It probably encouraged the Councillors to take a tough public stand against MTC's small vehicle report in their own report to the Legislature. Given the act's passage, the Council could realistically expect that its opinions would be given serious attention.

The Reorganization Act was the last important rearrangement of interagency relations in the 1967-75 period, the 1975 legislative session having considered no new bills on this topic.

1974-75 Interim

Complementary (Land Use) Planning

By August 1974,⁴⁸ the Council finally produced a land use policy. Briefly, it involved drawing a "Municipal Services Area" line around the suburbs and attempting to slow growth beyond that line to avoid the high costs of extending urban services ever deeper into the hinterlands. As Kelm quickly pointed out, this policy by implication de-emphasized clustering development within the suburban rings as indicated by the

older Major Diversified Centers concept.⁴⁹ As one veteran planner put it, "the Council took the earlier strategy and turned it upside down: before, definite regional center with fuzzy edges; now definite edge but no definite insides" (#12). The implication of the shift for transit planning was obvious. Whereas before it was at least arguable that MTC's rail option would promote the Major Diversified Center plan, it was definitely irrelevant to the new development policy, which not only lacked corridors but also downplayed subregional activity nodes. One of the major justifications for a rail system was eliminated--and Kelm knew it.⁵⁰

We should note here the difference between the stability of MTC's land use assumptions and the Council's instability. MTC's land use premises had the virtue of consistency--many people had criticized the Council's lack of direction in this matter--but once the Council adopted a definite position, it became evident that MTC had been planning on premises of sand.

Had this land use policy crystallized just two years earlier, the Council could have adopted the strategy advocated by a former chief planner and used its land use policy as a criterion to test MTC's transit plan. The Council could have reviewed the plan and declared it inconsistent with its Development Guide, and it had the authority to insist that transit adjust to development plans and not the reverse. A conventional, differentiated relation would have evolved. The problem was timing: the Council was nowhere near a firm land use policy in 1972.

1975 Legislative Session

The Low Capital Coalition

By the time the 1975 session began, the Citizens' League and the Council were substantially in agreement, and the stage was set for the last of the trio, the House. House transit specialists had changed from 1974 to 1975. Salchert, the committee chairman, had not run in the fall of 1974 and had been replaced by Tom Berg, who had voted for the 1973 MTC bill, but unenthusiastically so. Berg named Pete Petrafesso as transit subcommittee chairman, and together they more or less took over transit policy making in the House.⁵¹ Their May 1975 report turned emphatically away from all fixed-guideway solutions, whether conventional or advanced. A new zeitgeist, emphasizing managing existing transit capacity, was appearing in the urban transit literature which the Berg-Petrafesso report tapped.

As recently as 1968, Council and MTC planners tended to think automatically of fixed guideway systems when doing transit planning, so strong were conventional images. Only seven years later a new image had appeared. The conflict between the Council and MTC was crucial in providing the gestation time that the new ideas needed to become more coherent and receive institutional expression. In 1973, when MTC was seeking preliminary engineering approval, the low capital idea was just emerging. The Council's busways plan still bore the capital intensive imprint of an MTC plan which had influenced it, and the League had just proposed its first low capital transit solution. By 1975, the ideas had percolated into the Legislature where the Council's 1975 "policy plan" served as a convenient rallying point for low capital advocates. Shorn

of busways and eighty-three miles of freeway, it was cheaper than its 1973 predecessor, which magnified the difference between it and the fixed-guideway alternatives of MTC's last study.

Fixed Guideways

While the low capital coalition was taking form, MTC was having problems. Officially, MTC's main activity in the 1974-75 interim was its small vehicle study. But unofficially the controversy was taking a new turn that partly transformed the debate. During the interim, MTC unwisely engaged in intemperate lobbying. Senators opposing MTC's proposal were unfavorably portrayed, though not by name. (Ironically, the proponents of the alternative that eventually won, the low capital group, were not targets.) It was a grievous tactical mistake. The Senators held Kelm responsible, and the affair became more personalized. The Senate subcommittee voted 10-3 not to reconfirm him as MTC's chairman, which veteran legislative observers said had not happened in twenty-five years. Kelm had allies, including the Governor, and to avoid an intra-party confrontation a compromise was worked out and the question tabled. But the damage was done. Senatorial attention focused negatively on Kelm, and MTC's proposal "just faded away."

The personalizing of disagreements weren't the only factors that ended MTC's bid in the Senate. The key Senators had been primarily interested in advanced technologies, and when it became apparent in January 1975 that the technology was not as far advanced as once thought, interest in fixed-guideways declined (#11). The negative conclusions were reinforced by an Office of Technology Assessment report, issued about the same time, with similarly negative findings.⁵² Considering

the amount of attention devoted to the problem just months before, it is surprising how little interest was generated by MTC's final report comparing the selected small vehicle (a Group Rapid Transit, GRT) and its own vehicle. Only a few Senators attended and even they seemed disinterested (#11).

In its report MTC avoided making a final recommendation between conventional and advanced technology. This maneuver displeased the Senators, particularly Chairman Chenoweth. (The indecision probably bothered them less than did the lack of clear support for an advanced technology. I doubt they would have been pleased had MTC clearly recommended its conventional technology.) Two months earlier, Chenoweth had announced to the press that MTC could begin preliminary engineering on a small vehicle fixed-guideway as early as June of that same year (Star, February 14). This was viewed as a compromise by certain participants (#13): MTC would receive support for a fixed-guideway system that was in between pure PRT and its own forty-passenger vehicle, while the Senate would get some of the service attributes it desired. But MTC never responded. The time for compromise, the only opportunity that MTC had in three years to form a larger coalition with other governmental decision-makers, was lost.

It is quite conceivable that MTC's leadership believed it was in effect compromising by not making a final recommendation,⁵³ and by instead advocating one last alternatives analysis of PRT and rapid rail. But by this time the Legislature had had enough of transit studies and was not about to fund another. In fact, following a Council suggestion, the Legislature imposed a moratorium on fixed-guideway studies in that session.

As the fixed-guideway efforts closed in a peculiar, anticlimactic way in the Senate, the initiative swung back to the House, where the low capital advocates found expression in the Berg-Petraffesso report in May. The Senate's disillusionment with advanced technology and MTC's indecisive recommendation contrasted sharply with the House report's confident outline of the direction the region should take. Though the majority of the subcommittee were critical, the report probably reflected increasingly common sentiments among legislators, particularly non-specialists. It called for an end to transit planning and to the elaborate technical studies which fatigued most legislators and advocated a noncapital-intensive solution that entailed no politically dangerous taxes.

Although no poll was taken of state legislators, it is likely that mass transit had fallen sharply from its 1972 position as top priority issue. It is also likely that taxes had risen in priority. The Berg-Petraffesso report reflected these issue cycles, and the steps it outlined--no new capital outlays for transit, increased emphasis on paratransit--the Legislature followed for the next two years (Todd, 1977).

Conclusion

Before discussing the balance sheet of competitive planning's functions and dysfunctions, I wish to consider the instability of redundancy. In a sense, redundant transit planning was doomed from the beginning. Its existence was partly due to a legislative anomaly and the nearly simultaneous births of the two agencies. The jurisdictional situation was viewed by the Council as unsatisfactory almost from the

start, and attempts were made to rectify it as early as 1971.

The Reorganization Act that was to differentiate the planning and implementing roles did not eliminate the overlap as much as did the Council's new appointment powers and increasing fiscal authority. Even if Kelm had not erred by using impolitic tactics, the Council would have eventually appointed commissioners congenial to its views.

(Curiously, although several partisans on both sides appreciated the role that alternatives advocacy can play (#1, 4, 5), all were eager to eliminate it. The substantive outcome was more important than a decision process valued abstractly.)

One can argue that, though planning competition was unstable, it nevertheless lasted long enough, since selecting a long-range transit system is only a one-shot choice. Ongoing competition in such situations is not desirable. Indeed, Klein's model of redundancy in development projects requires that parallel paths eventually be pruned. This view has some merit. But transit planning is not as much of a one-shot affair as the weapons systems Klein studied. As specific corridors become more congested, and as oil prices continue to rise, rail (whether light or heavy) may yet prove desirable, a point acknowledged by several anti-rail partisans (#24). But with the altered Council-MTC relation, a solid organizational base for advocating rail no longer exists. Although Kelm and Jamieson are still chairman and head of long-range planning, MTC is clearly subordinate to the Council. It is therefore too early to conclude that the instability of redundancy is completely appropriate to the lumpy nature of the decision.

Of course the instability of redundancy was not due merely to a formal restructuring of powers. By 1975, MTC leadership had become

a nuisance to the Legislature as well as to the Council. Eventually legislators decided to treat the problem as a one-shot choice, to close the books for a while on trunkline rail. This decision was the result of informal feuds as much as of legal prescriptions. It takes energetic leadership to push hard for a risky solution (for which the Legislature commended Kelm in 1973), but sometimes such leadership is its own undoing. It will probably take a new generation of political elites to forget old battles and reconsider rail.

This brings us to the negative side of the balance ledger. (1) One may dismiss the personal politicization of the issues as an idiosyncrasy of this case. In part it was--but only in part. The same circumstance that increases the likelihood of agency competition, vigorous leadership, also increases the probability that fights will become acrimonious and personal. Such leaders are not likely to take setbacks calmly or opponents lightly. One can conceive of situations where strong opinions clash without frequent ad hominem, e.g., scientists arguing over the validity of theories. But the institution of science has been evolving for three hundred years, ample time for the growth of powerful norms proscribing personal attacks. American public administration has no equivalent tradition. Indeed, the anti-competitive tradition has made it less likely that norms regulating conduct in the face of "loyal opposition" would evolve. (I should add that the Twin Cities' political culture, emphasizing policy and program over party and person, makes it all the more striking that this conflict became personalized. If it can happen in Minneapolis-St. Paul, it can happen anywhere.)

The tendency to personalize disagreements was strengthened by the weak empiricism of planning competition. In Klein's model, rival

solutions are developed until a significant amount of uncertainty can be resolved empirically. Once one has several prototypes in hand, one can estimate more confidently how closely alternatives will approach their performance specifications. Although this procedure will not eliminate personal conflicts, it reduces their importance. But in this case several key uncertainties, such as patronage, were not resolvable in this incremental fashion (though others, such as Personal Rapid Transit's technical uncertainties, could have been reduced without building a system). Because the conflict remained on paper, the advocates' personal trustworthiness became more significant. Hence the mutual deprecation of staffs and consultants, which slid easily into invective.

We must be careful, however, not to exaggerate the effects of personalizing. Although relations became unpleasant between the two agencies, as in the AC-BART case, external considerations induced cooperation in other areas. An UMTA official commented, "Believe it or not, the Council has good relations with the MTC in terms of getting work out" (Tribune, 3/6/74). The negative by-product of conflict was more an enduring negative attitude toward rail than an inability of the staffs to work together on other problems.

(2) The financial costs of redundant planning were trivial. The Council paid Barton-Aschman only \$12,000 for its spring, 1972 report. However, if the ultimate selection had been MTC's system in, say, the 1975 legislative session, duplicate planning's financial costs would have been much greater since the two year delay would have added to final construction costs because of inflation. (If MTC's bill had passed both chambers in 1973, then competitive planning would not have

increased construction costs.)

(3) The time spent by Councillors and staff was not included in (2). Time, as an organizational opportunity cost, is probably more important than (2). Several issues, such as land use and regional finance, only the Council could handle; if it did not work on these no other agency would. This is therefore another instance of the gap-overlap problem discussed in chapter one: by doing redundant transit planning, the Council created a temporary regional planning gap in another issue area.

The question is whether the Council's Development Committee could have profitably spent its time on another problem. The most important candidate for the Committee's attention was land use. The Council did not start seriously working on a land use plan until Robert Hoffman took over the new Physical Development Committee in 1973,⁵⁴ and the Council did not officially accept the plan until 1975. Had the Development Guide Committee not spent so much time on transit from 1971 to 1973, (a) it could have produced a land use plan earlier, which (b) could have been used to judge the acceptability of MTC's transit plan, thereby avoiding the acrimony of duplicate planning.⁵⁵ Statement (a) is probably correct, but the accuracy of (b) is less certain. The Physical Development Committee required, despite its concentration on land use, nearly two years to develop a plan which the whole Council approved. It is unlikely that the Development Guide Committee could have completed the intricate technical and political process in time for the 1973 legislative session, which would have been necessary if the Council were to have used a differentiated rather than a redundant check on MTC.

(4) Vertical redundancies of the sort studied here usually involve organizations with unequal resources. A specialized, subordinate agency

has less authority but greater expertise and more time to analyze alternatives in detail. A hierarchically superior organization (legislative subcommittees as well as those like the Council) has to play catch-up and its staff is often not as technically up-to-date as the specialist's. For this reason one Council planning official made it a rule not to transform his generalist staff into transportation specialists as they would become outdated too quickly (#12). Although Graven's committee, staff, and consultants covered much ground in six months of intensive work, their report was not nearly as detailed as MTC's third plan. They had not addressed certain crucial issues, and these omissions were glaringly apparent before the Legislature.⁵⁶

(5) One might argue that advocates of different transit systems devoted so much time fighting one another they lost the opportunity to coalesce, settle on a strong transit alternative, and promote that against the highway coalition. By fighting each other, they weakened the transit coalition and achieved only the lowest level option, an all-bus system lacking exclusive lanes. As a result the area must still rely on its auto-highway system.

This assertion is partly correct. It is fair to say that the Council's transportation plan for 1990 emphasizes highways. The plan is estimated to cost 5.8 billion dollars by 1990, of which 4.5 billion are for highways (although most of the highway construction will be outside the urban ring). But the assertion assumes what should be proven, namely that there did exist a strong transit alternative in the early seventies. Much of the controversy focuses on just this point, all participants having recognized that the Twin Cities are not the classic high-density, strong transit case. It was not, and is not,

obvious that any of the options were strong candidates. Different groups were differentially optimistic, MTC about reduced rail, Ed Anderson et al. about PRT, the Citizens' League concerning high-occupancy vehicles, and to a lesser degree the Council about buses. Summing up each group's deflating criticisms of the others' options produces a pessimistic picture. Buses' operating costs have risen quickly, riders have not swarmed into carpools or vanpools, PRT still does have numerous technical problems, and it is uncertain whether rapid rail would have been worth the price given modest corridor volumes. The diffuse optimism of 1972-73 that one of the alternatives would be highly effective has dissipated, certainly in the Legislature, and probably in the Council. The region was nurtured by the car, and it is unclear how to wean it.

Functions of Redundant Planning

(1) Because the Council had an alternative to, rather than merely a negative critique of, MTC's plan, an enormous amount of newspaper coverage and public attention focused on this issue. Thus there was little danger that a large investment could have been foisted upon an ignorant Legislature. Certainly legislators were uninformed in 1973, and having three alternatives before it helped the Senate resist pressure to vote immediately, and to gain more knowledge in the next two years. It may be asked whether the legislators' increased knowledge was actually beneficial. This is not easily answered, but it should be pointed out that the legitimacy of the regional planning process, if not the effectiveness of its product, depends partly on the belief that when a higher authority approves a plan, it is doing more than rubber-stamping. It

can do no more than rubber-stamp if its members are ignorant.

(3) The delay caused by competitive planning allowed changing regional trends, in particular declining population projections, to become more evident and to work their way into planning.⁵⁷

(4) The delay permitted the maturation of an idea, defining transit as riding rather than as public vehicles, which may prove the most important policy shift of all. It is unfortunately too early to tell. But if the implied strategy of increasing vehicle occupancy works, it will be a very inexpensive success.

(5) The big question, of course, is whether the correct decision was made. I would like to assert an unequivocal 'yes' or 'no,' but cannot for two reasons. First, it is difficult to know how the discarded options (in particular rapid rail) would have worked out.⁵⁸ Although we can compare, for example, bus operating costs with 1972 Council predictions, we cannot contrast rail's actual patronage with consultants' projections, or how much it has reduced the area's oil dependency. Second, as some officials on both sides acknowledge, whether choosing buses over rail was wise depends partly on exogenous variables, such as oil's price in 1990, that they can neither control nor accurately predict.

I nevertheless provisionally conclude a sensible decision was made. My main reason is the greater flexibility of the (non-busway) bus alternative. This flexibility was demonstrated in 1977 when the Legislature, alarmed by skyrocketing operating deficits, established fiscal criteria for routes. These criteria reduced the system's size. Had rail been caught in an inflationary spiral during construction, there would have been virtually no option but to continue building. Secondly, because the Council has not adopted a strongly complementary

land use policy, and because the population is not increasing quickly, it is unlikely that rail by itself would have significantly shaped development. The circular chain of events in which rail would help create corridors that in turn sustain rail would probably not occur. Finally, rail could not have substituted for freeways, as it probably has in Washington, D.C. (see Chapter Five), since the Council's 1990 transportation plan does not recommend building any long freeway stretches that could have been rendered superfluous by a rail system.

We now turn from this case of competitive planning to the case of monopolistic bus-rail operations in Washington, D.C.

FOOTNOTES

¹And ultimately prosecuted.

²It carried about 97% of the region's transit riders.

³Deleted.

⁴Until 1974 the Minnesota Legislature met only on odd years.

⁵Recall the similar problem concerning AC and BART's formations.

⁶A bill to create an MTC had failed in the 1963 and 1965 Legislatures.

⁷It does not appear, however, that the Legislature established the arbitration rule with the deliberate intention of deciding between competing plans. It was simply a provision for resolving conflict between two differentiated agencies.

⁸Many significant regional organizations were created in this period, and the entire organizational ecology of the region was in ferment. The Council was jockeying for position not only with the single-purpose commissions, but also with the Minnesota Highway Department and the local governments. (In particular the central cities' planning staffs felt capable of engaging in long-range planning; #35.)

⁹The possibility of this conventional evolution makes the overlap that did appear in retrospect still more chancy: not only did it depend on the virtually simultaneous passing of two ambiguous bills, but also on avoiding the conventional evolution of division of labor.

¹⁰Several interviewees believed this was the fairest MTC study (#4, 26).

¹¹The Joint Program's estimate had been 4,000,000 by the year 2000.

¹²An MTC staffer reported at a board meeting that Council staff was not sure that a fixed guideway plan was consistent with constellation cities. Commissioner Martineau said that he tended to agree with the Council (Star, 4/9/70), but the staffer replied that more information was required from the Council regarding details of the constellation cities plan before consistency could be judged.

¹³The Citizens' League, an important political group, had advocated creating a metro council and tended to support it. There were numerous close ties between the two organizations.

¹⁴At this time in the region there was some fear that the Council was becoming dangerously powerful, and enough legislators shared this view to weaken the Council bill (Star, 4/28/71). Ironically, the new MTC chairman, Doug Kelm, described himself "as a fan of the Metro Council" and publicly supported efforts to increase its powers in order to shape regional growth (Tribune, 11/11/71).

¹⁵The extreme version of this interpretation was given me by an MTC official who said that the Council's need to assert authority in this policy area automatically required that it back a different alternative than MTC's. I do not think that the Council's modal choice was that closely tied to its stimulus for becoming involved.

¹⁶Indeed, one sympathetic participant-observer remarked that he thought that Kelm was basically attempting to implement a land use plan via his new job as MTC chairman.

¹⁷Several interviewees (#33, 28) believed that the board became less independent-minded during this period, and it is true that the chairman occupied a more dominating role in 1972-75 than 1968-71, and that the views of other commissioners were less reported by the press.

¹⁸I should add that MTC was not going for final system approval in the following year's legislative session, but only for preliminary engineering approval. But the Council activists probably believed that preliminary engineering approval would be a nearly irreversible decision, and the battle would be fought as if final approval were at stake. This belief would account for the priority the Development Guide Committee accorded transit that year.

¹⁹The committee noted that the Council's February 1971 referred to the more ambiguous "fast link" transit, while the Council-approved Transit in Transportation referred to fixed guideways.

²⁰These Kelm said were "carefully selected," presumably in order to present a case against fixed guideway systems. I could not find any pro-fixed guideway speakers invited.

²¹This was partly for external consumption, as most Council staffers and several Councillors were privately skeptical about advanced technologies.

²²As I understand their plan, one would use busways only as a measure of last resort on link sections where the bus would otherwise become bogged down in traffic (#18).

²³The other end of the spectrum, advanced technologies, had been devastated by the visit of several Councillors to the disappointing TRANSPO exhibit, and by the subsequent circulation of a memo by the influential Don Dayton on that subject.

²⁴According to one official, this was a chronic Council problem: it was forever "playing catch-up" with the plans of its special purpose agencies (#18).

²⁵This was the DMJM estimate for 1995; Voorhees' for 1985 was

8,000.

²⁶The rule of thumb used by Council planners was that a corridor should generate 30,000 passengers per hour to justify rail. MTC retorted that the successful Lindenwold line showed that more moderate densities were sufficient.

²⁷MTC retorted that their plan would increase transit's proportion of peakhour trips to the central cities from 40% to 60%.

²⁸As indicated by both newspaper reports and interviewees' memories.

²⁹Of course some of the disagreements could not be resolved purely empirically. Most important of these was the Council argument that the increase in regional transit patronage under a rail system was insufficient to warrant the cost.

³⁰Even when there was a referee (the Legislature the following year), the legislators did not find it easy to regulate the process.

³¹Several Council officials doubted that the MTC did not know that the Council was preparing a counter-plan, as they were in the same building then (#22).

³²The MTC reminded the Council several times that year of 1971 commitments.

³³We must tread cautiously on this point because of its sensitivity and because there is no hard evidence one way or the other, just hearsay and unconfirmed suspicions. I must add that opinions ranged widely on this matter: some Council staffers thought the MTC consultants highly competent (#35, 14), while some MTC commissioners were more than a little suspicious of the staff-consultant relationship (#37, 25, 23). Regardless of who was right, the distrust that developed is an important

datum that cannot be ignored in any study of bureaucratic competition.

³⁴I believe that a presumption of exclusive or monopolistic authority may have been made: if we can show that the MTC clearly has authority to plan then it automatically follows that no other agency could have such authority.

³⁵I have not discussed the activities of interest groups such as business organizations or labor, in part because of my theoretical focus on bureaucratic redundancy and in part because they did not seem to play a large part in the process (#20, 19). The business community was divided between support for MTC's plan and opposition based on fiscal grounds, so there was no unified tendency which could have had a strong impact. In addition, there were some highly respected and influential businessmen on the Council, so it is quite likely that business felt adequately represented. Regarding labor, although it came down solidly behind the MTC, at least after 1973 it seems to have had little effect. Legislators who became transit specialists seemed to discount labor's support for the construction alternative since that position was so unsurprising.

³⁶I cannot reveal his identity, but he was in a position to know.

³⁷Unlike MTC, the Council did not present a bill, but only a plan.

³⁸However, the aspirations created by PRT in 1973 were unrealistic: the Senate subcommittee's report, written after the session, instructed the MTC to investigate an advanced technology system whose properties proved to be a wish list which could not be built in the medium range future.

³⁹The Legislature started annual sessions that year.

⁴⁰One interviewee hinted that cool relations between the two

chairmen hindered the effort (#5).

⁴¹Legislators generally conceded that there was no way to decide, on the basis of the pre-1974 statutes, which agency was on stronger jurisdictional grounds (#19). Consequently there was widespread agreement a reorganization bill of some sort was required.

⁴²He criticized the present structure as "a patchwork . . . in which the Council's planning role and its authority overlap and conflict with those of the cities, other metropolitan agencies, and the state" (Tribune, 3/21/73).

⁴³It also advocated diminishing the demand for transportation by land use policies which encouraged living near workplaces, another point on which the League and the Council would agree.

⁴⁴Council planners had begun to draw maps of trip clusters and found higher clusters of subregional trips than they had expected (#17).

⁴⁵Although according to a veteran observer of regional politics, bypassing still occurs (#33).

⁴⁶The motivation for removing the arbitration clause probably rested at least as much on the Legislature's desire to have done with metropolitan quarrels, as upon a desire to strengthen the Council. One of the major reasons for establishing the Council in the first place was to remove a sticky problem from the legislators' shoulders; the arbitration clause opened the way for such problems to return to them.

⁴⁷Apparently the Council used, as a criterion of selection, loyalty to itself (#4).

⁴⁸It was not approved by the whole Council until March 1975.

⁴⁹One council staffer maintained that there was no inconsistency between the two ideas (#10), which is true, but there was a difference

in the degree of emphasis placed upon them.

⁵⁰I am sure that Kelm would have liked to challenge the Council's development policy, but the MTC had neither the expertise nor the legal authority to do so. The "reverse redundancy" of MTC becoming involved in land use planning did not occur.

⁵¹This turnover caused a temporary loss of expertise, as Petrafesso had to learn about transit alternatives what the former top House specialist had already found out in eighteen months of work.

⁵²One MTC official felt that the Senate "was ready to jump all over us" for their small vehicle study, and that only the independent corroboration of the OTA report prevented that. But memos from a legislator's files indicate that while the Senators were indeed suspicious, they thought the study was conducted fairly.

⁵³It may have been difficult for the MTC to make a simple recommendation, as the evaluation of ICRT and GRT had turned out to be close--neither system dominated across all dimensions. And as Senate leaders had insisted that the weighting of evaluative criteria be left up to political decision-makers, the consultants did not sum the systems' scores across dimensions.

⁵⁴The Council reorganized its committee structure that year.

⁵⁵Some of the acrimony anyway: there doubtless would have been a quarrel even if the Council had challenged the MTC in a differentiated manner.

⁵⁶Similarly, the Senate subcommittee and staff, although they boned up quickly on transit information, pursued the advanced technology alternative which proved to be unpromising for at least the medium term. And that conclusion, reached in 1975, had been reached six years earlier

by MTC's first long-range consultant.

⁵⁷For example the final MTC report's patronage estimates were based on the most recent population forecasts provided by the Council.

⁵⁸Building a single corridor of rail in the most densely travelled section would have helped to reduce these uncertainties, but as was indicated by the negative reaction to Voorhees' staging recommendations, there would have been political problems in trying that in 1970. Today that strategy is probably infeasible.

APPENDIX

A METHODOLOGICAL NOTE:

INDEPENDENCE IN PLANNING COMPETITION

Establishing whether multiple planning teams are (statistically) independent is much more difficult than doing so for operational redundancy. There are two major problems.

First, in planning similar mindsets or orientations can produce similarly flawed plans. Although there may be no overt contact between teams, homogeneous outlooks can produce correlated errors (recall Chapter One, p.26). This is the most insidiouscrippler of planning competition, giving it the appearance but not the reality of underlying diversity.

What is the evidence on the Twin Cities case? At the staff level there were differences in previous job experience: Metro Council staffers were more likely to have been highway planners at one time in their careers. This suggests, although not conclusively, that the two staffs would be predisposed to think of transit in dissimilar ways, with Council staff less inclined to think automatically of fixed guideway systems and more inclined to think of transit vehicles on highways. Career differences among elected officials and top executives were less relevant to transit planning, because this set was composed of lawyers, politicians, businessmen, and other generalists whose training would not predispose one toward any particular transit mode. Consequently I

expect no strong correlation of mindsets at this level, and if anything a negative correlation might be expected among staff.

There is a second difficulty. In competitive planning, rivals will often be in touch with each other, which means faculty decision premises can be transmitted. Dependence or interdependence, bane of redundancy in engineering, can develop.

In fact, however, the contact between the two agencies did not produce agreement on the most important issues. Ironically, the futility of mutual persuasion, which frustrated all participants, preserved the independence required in the design of redundancy. While the agencies were not hermetically sealed, as are teams in laboratory experiments on redundancy (Felsentahl and Fuchs, 1976), their essential diversity was maintained.

In conclusion, then, the overlapping agencies seem to have been sufficiently independent so that using the concept of redundancy was justified.

CHAPTER FIVE

The Washington Metro¹ system of nonoverlapping bus and rail service run by a single organization is an ideal case to compare with the AC-BART structure of independent parallel service. The primary emphasis of this chapter is on the advantages and disadvantages of integrated, non-redundant service (p. 189-215). The introductory section (p. 177-188) describes premerger relations between private bus companies and WMATA, and how merger was accomplished. The first section is not intended to be a general history of Metro planning. That has already been done (Murin, 1971; Hamer 1976). Rather, it focuses specifically on the bus-rail relations.

Premerger Bus-Rail Relations

The history of premerger relations between the bus companies and NCTA/WMATA^{1a} should not be interpreted backwards from time of merger. There was little planned about integration, and for several years in the sixties it appeared that if any integration were to take place it would be under the auspices of D.C. Transit's owner, O. Roy Chalk, rather than a public takeover of private organizations.

When mass transit planning started in the late fifties, the four Washington metropolitan area bus companies were profitable concerns and would remain so through most of the sixties. They had not yet exper-

perienced the downward spiral of declining patronage, increased fares and further patronage loss that had already hit many private transit firms. This is not to imply that they were in uniformly good shape. In particular, D.C. Transit, by far the largest, may have already been suffering from undercapitalization (Post, 4/6/72). After Chalk bought the franchise in 1956 from Louis Wolfson, the financier who had plundered the property, D.C. Transit needed improvements. Chalk, however, invested only a small sum in it. Although he enjoyed a few years of good relations with Washingtonians^{1b} (after Wolfson he was an improvement), by the mid-sixties D.C. Transit's reputation was again not the best. Although precise comparisons are not possible, it is a reasonable inference that D.C. Transit, during the Metro planning years, was not as satisfactory an operation as AC was at a comparable time during BART planning.² Buses in Washington were from the start poorer competition.³

Unlike AC and BART, there was never any pretense in Washington that rail and bus were going to coexist peacefully. Being private concerns, the bus companies were not diffident about pressing their point of view. When NCTA (National Capital Transportation Agency) unveiled its plan in 1962 for eighty-three miles of rail,⁴ the bus companies were quick to respond, meeting in summer 1962 to plan how to protect their interests. Since the bus firms' service areas overlapped only marginally, there was little intramodal competition. Forming a coalition was consequently not difficult, and they agreed to deal with the challenge collectively.⁵

The minimal overlapping of bus service areas was indicative of the monopolistic character of Washington area transit. While the D.C. taxi industry is among the most competitive in the nation, the bus (and previously streetcar) industry has been organized on a franchise

(monopoly) basis for many years. Monopolistic transit thus had a long tradition in the region--which the bus owners intended to maintain.

NCTA planners tried to persuade particularly the suburban lines that introducing rail would help the bus companies by eliminating the necessity for commute lines to travel on the most congested parts of their routes (approaches to D.C. and downtown), and by generating great demand for feeder service to stations. Although there was no study of rail's financial impact on buses, such as the gloomy 1962 DeLeuw report done for BART, the bus owners were unconvinced by NCTA's argument.⁶ At the 1963 Congressional hearings, AB&W's general manager protested that, far from benefitting the buses, rail would "cream" AB&W by taking the through riders and leaving it with the burden of local lines: "it is a known fact in the business that the through routes are the backbone of the business" (1963 Hearings, p. 2).⁷ The testimony of NCTA's chief, Darwin Stolzenbach, only partly reassured them. Though he did not propose eliminating Virginia-D.C. bus lines entirely, as long as there was sufficient traffic, he was

sure that the putting in place of a large rapid transit system is going to require vast rescheduling of local bus operations throughout the whole region.

(ibid., p. 85)

But even if the longhaul buses were not forced to turn back, the owners were unhappy with the prospect of competing with rail for commute patrons (p. 265). Chalk advised the committee that his franchise gave him monopoly rights over all public transit in Washington. In fact the 1963 bill did not say who would ultimately operate the system, but it was evident that Chalk feared the government would. And if rail was going to be built,

he wanted to run it.

In addition, the bus firms and their ally, the Washington Metropolitan Area Transit Commission (WMATC), argued that buses could do the job for less money.⁸ Rail was not needed for the projected densities. Here Chalk relied heavily on a report by Martin Wohl.^{8a} This report, like the well-known Meyer, Kain, and Wohl book then circulating among Washington planners, argued that corridor flows of greater than 30,000 people per hour were needed to justify financially investing in rail.⁹ In less heavily traveled corridors express buses would suffice. On narrow cost-effectiveness grounds this position had merit, and subsequently transit specialists critical of Metro's planning would point to this period as the time when Washington missed its golden opportunity to avoid becoming bogged down in a massively expensive, capital-intensive project (Hamer, 1976, pp. 139-143; Roth, 1977). But the argument had one serious flaw, which can be revealed by inspecting some historical background. The 1959 Mass Transportation Survey plan had evoked a storm of reaction from early antihighway groups. First, the proposed 248 miles of highway threatened Washington's distinctive physical character. Second, they would also displace between 28,000 and 75,000^{9a} people from their homes, mainly black people in inner Washington. The NCTA plan, in large part a reaction to the 1959 plan, presented rapid rail as a substitute for new highways.

This issue was the Achilles heel of the bus proposals. When Chalk, et al., were arguing for express buses as an alternative to rail, they were also endorsing the freeway building program--explicitly so (1963 Hearings, p. 263). Congestion on bridges leading from Virginia and southeast Washington was hurting the suburban bus companies; congestion on D.C. streets was hurting D.C. Transit and the others. Conse-

quently all four companies endorsed building the Three Sisters Bridge, the inner loop, and the north central route. In short, an express bus system meant a highway program accompanied by its destructive side effects.¹⁰ This implication was pointed out by Representative Whitener during the Hearings (p. 330), and the Transit Commission's director he was challenging had no answer to the criticisms. Washington was quite unlike Minneapolis, where selecting the bus alternative did not imply much highway construction in densely populated areas.

Although the bus firms opposed NCTA's plan, the debate before and during the 1963 hearings did not reach the level of competitive transit planning that characterized the Twin Cities agencies a decade later. The bus companies had not developed detailed alternative plans, claiming that they were unable to finance consultants necessary to study the matter. When Whitener criticized the Transit Commission for criticizing NCTA without themselves being able to answer specific questions about an express bus system, the Commission director replied that they could produce answers if they had more money. Whitener, however, retorted "Yes, but you would be duplicating the same studies that the taxpayers have already paid for one time" (*ibid.*, p. 325). Planning money never materialized.

The organization of transit planning in Washington was relatively monopolistic:^{10a} opposition existed but not counter-planning. In part this was because of a conventional division of labor. NCTA was authorized to do transit planning, while the Transit Commission, the natural governmental spokesman for bus firms, was a regulatory agency and had no planning responsibilities.^{10b} Furthermore, NCTA and the Commission reached a reconciliation in March 1964, when they agreed "not to criticize each other in public any more" (Post, March 3, 1964). This agree-

ment ended a discussion which, if it had not reached the specificity of competitive planning, was at least a debate between agencies which had a vested interest in advocating different solutions.

In addition, the bus companies may not have been especially interested in counterplanning. From the 1963 testimonies it is clear that they concentrated more on the potential financial threat of rail to their properties than on generating alternatives. In the early sixties the prospects for rail in Congress were not good. Local transit labor unions had joined the powerful highway lobby in opposing it, and local financing support was problematic (Murin, 1971). Chalk, et al., may well have believed that opposition without developing options would be sufficient. Thus they were sluggish in furnishing Congressional committees with even sketchy plans. Subsequently in May 1964 Representative Sickles would berate the bus companies for taking so long with their financial plans (Star, May 23, 1964). Though they were unsuccessful in persuading the subcommittees that they had a viable alternative, they were successful in arguing that a government run¹¹ would unfairly compete with "free enterprise" by "creaming" the long commute routes and leaving the less profitable routes. While today government ownership and operation of transit are taken for granted, it was a hot issue in 1963-65. Furthermore, the bus companies, particularly AB&W and D.C. Transit, had powerful friends on the Hill.¹² (The bus companies' contacts in Congress were better than their relations with agencies that built and maintained the road/highway system.¹³ That reinforced their tendency to use a strategy of protecting their property rights rather than specifying an express bus system plan which would have required close collaboration with highway agencies.)

NCTA's first, eighty-three mile plan never made it out of

committee. Instead, the committee, dubious about the larger system's financial solvency (Murin, p. 58), recommended a "bobtailed" version of twenty-two miles. This was basically a D.C. subway with spurs across the Potomac. Even this the bus companies opposed,¹⁴ arguing that having commuters ride almost to D.C. only to transfer for a short rail ride did not make sense. NCTA replied that "a major asset of 8929 (the bobtailed system) was the location of proposed rapid transit terminals outside the congested area" (1963 supplement, p. 14) so that commuters could bypass the worst traffic. Once again, at the bottom of this disagreement were different preferences for and expectations of new highways leading into D.C. If these were not going to be built, NCTA's reply made sense.

The bus companies must also have been concerned that big systems can grow from bobtailed ones. This concern was articulated by their ally, the Transit Commission. The Commission urged that if rail were to be built at all, the construction should be staged, not by building a scaled down version of a big system but by building and finishing single lines in the most favorable (high density) corridors. Though this was reasonable in terms of transit technics, it was naive politically because it ignored financing and fairshare¹⁵ problems, as well as Congress's expressed interest in a downtown subway.

Even the scaled down Whitener Plan was sent back to committee by the House. NCTA's attempt to develop a transit plan which was a substitute for highway planning, rather than conciliate the highway coalition by producing a "balanced"¹⁶ transportation plan, created much animosity towards NCTA, its plan, and its chief. In addition the bill contained inadequate protection for labor unions and bus companies. The next director, Walter McCarter, would take care to avoid such mistakes.

Not only was NCTA's second plan rejected, it was also stripped

of its highway planning powers. This loss ensured that it would thereafter be concerned only with rail as a transit mode, because any improved bus system would require changes in the road and highway network, and such changes after 1963 were outside NCTA's jurisdiction. It would henceforth be identified as a modally specialized organization.

Not so the bus companies, however. During the next set of Congressional hearings in 1965, Chalk still displayed interest in operating the rail system. In fact he argued more forcefully for an integrated transit system than did McCarter. The latter was content to say that, though he was for private (possibly contract) management,

The areawide transportation system does not necessarily have to have a unified management. It is good if it does but it does not have to have it.... Coordination of service can be achieved by agreement, and through the local transit regulatory commission (WMATC).

(1965 Hearings, p. 76, 273)

To further placate bus opposition, a clause which said that "unnecessary duplicating service be eliminated" was deleted. McCarter claimed that

there is no intent that privately owned companies would be forced to discontinue a service merely because it was paralleled by, or was competitive with, rapid rail service.

(ibid., p. 47)

Chalk, concerned that the region could not sustain two competing transit systems, argued that his company should operate both under a franchise arrangement. D.C. Transit's¹⁷ strategy had changed from simple opposition to seeking organizational consolidation. It is unclear why the change occurred.¹⁸ It is possible that the bus firms, with their

close Congressional contacts, were informed that once certain financial changes were made in the 1963 bobtailed version, Congress was likely to approve it and that the most they could get was a guarantee that rail be privately managed.¹⁹ This guarantee was written into the bill passed by Congress in 1965. The bus companies--more precisely, D.C. Transit--had won a victory in securing the private management clause, but had been unable to prevent Congressional legitimation of rail. Thus by 1965 the scanty degree of transit planning competition that had existed came to an end.

During the late sixties bus-rail relations diminished in importance. NCTA had been given a mandate by Congress and there was little the bus companies could do about it. As far as NCTA was concerned, its biggest problem by far was Representative Natcher's effort to block funds. This obstacle dwarfed other problems. The only major contact in this period between the two modes was a formal meeting between McCarter and the bus firms' heads in March 1966 in which the participants agreed to cooperate on an origin-destination survey of bus passengers. Relations between D.C. Transit and NCTA remained strained (the former refused to let the latter study their records); but the Transit Commission had the information that NCTA needed in order to plan bus-rail coordination, and its books were open.

In 1968 Metro completed its first detailed finance and services plan, which required making assumptions about the organizational status and service characteristics of buses for the next decade. The study assumed private ownership (the 1967 WMATA Compact still denied it operating authority); it was expected that, given fare increases commensurate with rising costs, the bus companies would remain solvent. But Metro had moved away from McCarter's laissez faire position of 1965. There was to be "no inefficient competition": duplicate routes would be eliminated,²⁰

and the bus systems would be reoriented toward feeders.²¹ To promote use of combined bus and rail rides, there would be free transfers in both directions. Although no definite revenue-sharing procedure was specified, the report recommended a fifty-fifty split, as it recognized that some kind of revenue-sharing was required to keep the bus companies in the black.

These were of course WMATA's expectations, not the bus firms'. I received conflicting views on what the bus firms were intending to do at this time, i.e., whether they were going to cooperate with Metro's plan for a differentiated and interdependent relationship. A former D.C. Transit manager said his firm probably would have reoriented toward a complementary relation (#9), while a former AB&W executive and two former suburban bus staffers indicated that there was considerable sentiment for maintaining many parallel lines (#6, 5, 14). The key probably would have been the revenue-sharing arrangement. Presumably the bus owners were disinterested in competition per se, and a reasonable profit margin would have induced them to reorient. Of course, the organizations may not have been able to negotiate a settlement, but here the situation was markedly different from the Bay Area's. Until the Metropolitan Transportation Commission arrived, there was no organization capable of brokering AC-BART revenue and transfer problems. In Washington there was the Transit Commission, and it was expected (#6) that if the bus companies and Metro could not agree on a revenue-sharing and transfer scheme, then the Commission would step in. It could direct the private carriers to coordinate schedules, joint fares, and routes with WMATA (WMATA Compact Section 56b), though it had no jurisdiction over Metro service. The Washington area was institutionally equipped to handle interorganizational disputes.

Toward the end of the sixties, however, these issues were becoming increasingly moot. D.C. Transit entered the red permanently in 1967, and by 1968 all but AB&W were losing money. The 1968 riots which followed Dr. King's assassination merely speeded the decline: the bus companies belatedly started the downward spiral that had already finished most major private transit systems. AB&W, with its Shirley Highway express lines and high quality service, was least affected; D.C. Transit was most affected. As one former Metro official graphically put it, D.C.T. started "to devour its own corpus" (#17): maintenance men were laid off, service cut, equipment deteriorated. Chalk became exceedingly unpopular in Washington, and the bus system came to be regarded as a public disaster. Far from being an alternative to rail, the major bus system was not satisfactorily performing the tasks it already had.

By 1971-72 it was obvious that public takeover was only a matter of time. Congress had had enough of Chalk and was urging a takeover. Metro, however, was far from enthusiastic (#7, 39, 22). It was deeply involved in problems of rail construction and financing. Several top officials believed that the timing was poor and that they should wait several years to complete construction before taking on a new responsibility. (An added bonus of delaying was a lowered cost of acquisition if D.C.T. went bankrupt, though this "benefit" was not universally so regarded inside WMATA (#17).)

While Metro was moving slowly, the Northern Virginia Transit Commission, urged on by AB&W management, was displaying interest in taking over the two Virginia lines. Publicly the Northern Virginia Commission said that it would do so only as an interim measure, but some participants and observers believed that there were Northern Virginia

officials and Virginia politicians who were opposed to a Metro takeover and wanted a permanent arrangement (#17).²³ The Northern Virginia Commission was the only organizational alternative to a Metro takeover, but it lacked the latter's political clout in Congress, and Metro leadership had decided that it would accept the charge that Congress was urging upon it. It was therefore not difficult for Metro in 1972 to turn aside the Northern Virginia Commission challenge and receive authority to acquire the bus systems. Operating authority had been granted the previous year.

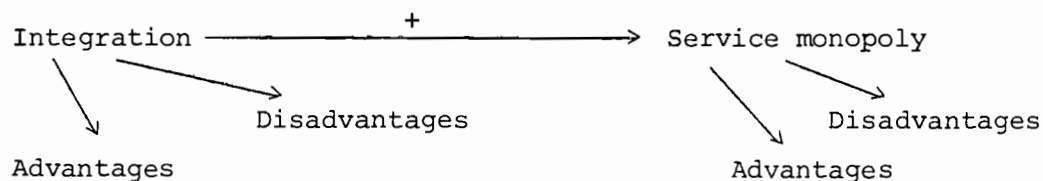
Given Metro's reluctance, and some degree of opposition, why did the buses land in their laps? The answer is simple. It was widely held^{23a} that the four interstate bus systems should be unified, and Metro was the only interstate organization with (nonregulatory) transit responsibilities.²⁴ Thus Metro was the only candidate. Composing the 1967 Compact had been a political feat of considerable proportions, and understandably it was not thought worth the effort to create another interstate Authority. Metro existed and would suffice: that was the opinion of Congress, DOT Secretary Volpe, and virtually every participant and observer with the exception of the NVTC and a few others.²⁵ It was not a controversial decision, as there was virtually no anticipation of the difficulties that Metro would encounter.

It must be emphasized that although speakers at the takeover hearing referred to merger benefits such as ensuring integrated planning of complementary service ("Bus Systems Acquisition," p. 8, 43, 47) and eliminating overlaps,²⁶ the takeover was not a calculated attempt to realize these ends. It was a rescue operation, with Metro as the rather reluctant rescuer.

Post-Merger Modal Relations

Although the merger was more accidental than planned, it nevertheless gives us an opportunity to compare the effects of organizationally integrated, nonredundant service with the organizationally separated, redundant service of AC and BART. We must take care, however, to disentangle the effects of two distinct, though related, causes: (1) the effects of integrating the administration of two modes within one organization; and (2) the effects of changing the bus route network in order to create service monopoly.²⁷ As Fig. 1 indicates, although integration

Figure 1



increases the probability that service redundancy would be eliminated, it would have been possible for an integrated structure to retain service redundancies.²⁸

I will first describe advantages of integration and follow that up with an analysis of benefits of nonredundancy.

Advantages of Integration

It is a cliché in studies of administrative behavior that coordination is desirable. When things go amiss, a call goes forth for more coordination. Nevertheless, coordinating the operation of two modes is

important: patrons want to know whether they can transfer smoothly, cheaply, and reliably between modes. Moreover, we have seen in the AC-BART case that it takes no little effort to provide this. Metro, as an integrated organization, proved to have an advantage here. There were two indications of this. First, Metro financial staffers could devote considerable effort to reducing the expense and awkwardness of the bus-to-rail transfer. At the same time they knew that any proposed solution would only have to be accepted by a single (albeit federated) organization that treated intermodal financial exchanges as an internal accounting matter rather than as an interorganizational negotiation. The Metro staff first arrived at an arrangement that was basically equivalent to AC-BART's, but their effort did not stop there. Methods more acceptable to riders were sought, and a decision was reached in 1978 to sell flash-passes that could be used in the rail's faregates and flashed to bus drivers.^{28a} I believe that the integrated structure increased aspiration levels for meshing complementary modes, which in turn increased the problem-solving effort.

Second, there are several problems of timing at the intermodal transfer points, particularly in a transit system's early phases. For example, in the afternoon buses would sometimes leave just before a train arrived. These problems tended to fall in the cracks between AC and BART;²⁹ in Metro, bus supervisors were instructed to monitor bus operators to prevent that.³⁰ Fairly substantial resources were devoted to smooth things out at stations (#20), and rail supervisors can hold up the buses when trains run late (#45).^{30a} There is little question that Metro tried harder to ameliorate physical interface problems than AC and BART did.

I had believed that a third indicator was that the physical

design of the stations was better for patrons using rail and bus (e.g., busbays were in general conveniently located). But the designs were drawn up in the late sixties by WMATA staffers before the organizations merged, and even before it was obvious that merger was imminent. Consequently, the superior physical interface cannot be attributed to organizational integration, but was probably a result of WMATA's expectation that buses would be the key access mode to rail.³¹

Economies of Scale ,

Although the possibility of economies-of-scale was not discussed during the takeover hearings, in governmental reorganizations in general it is often expected that merging like functions will produce such benefits. Before plunging further into this difficult question, one qualifying factor must be mentioned. It is quite possible that several of the private bus firms, particularly tiny WMA, were below optimal size in terms of inventories or garages, and that merger with other bus units would permit better use of these factors. These considerations constitute plant economies of scale, alluded to in Chapter One, which are the most measurable of scale economies. These benefits result from merger of organizations with similar or identical technologies (buses) rather than like functions (transit); a bus-rail union would not be required to realize these.

Scale economies resulting from bus-rail merger pertain to administrative rather than plant savings. Unfortunately Metro financial statistics do not provide data on the proportion of the budget devoted to administration, so we cannot directly test the hypothesis that Metro saved money as a result of the 1973 merger. Numerous bus-only and multi-modal transit agencies do provide such data, however (Tables 1 and 2), so we can indirectly probe the question by comparing the percentage of

budget absorbed by administration in bus-only as against bus divisions in multimodal organizations.

First, note there is no consistent relation between agency size and administrative (proportional) costs within each modal category. Second, note bus-only organizations devote a smaller proportion of their budgets to administration. There is therefore little reason to believe that Metro enjoyed economies of scale as a result of bus-rail merger.

Advantages of Monopoly Service

The primary advantages of nonredundant transit service are budget reductions, or maintaining the budget and reallocating redundant resources. Metro has taken a mix of the two courses. Some buses and drivers have been eliminated, and some buses that previously carried commuters downtown now drop their patrons at rail stations and turn back for more runs. Instead of the single peakhour trip they once made, they can now make two. The integrated organization can exploit the different modal technologies, allocating each to tasks for which they are suited--the bus, with its greater ability to collect and distribute patrons, acting as a feeder, and the rail, with its presumably lower operating costs, acting as linehauler. We should note, however, that the board's policy decision to drop all parallel bus routes was based exclusively on a straight economic, cost-cutting criterion--reduce budget deficit by eliminating duplication--and not on a criterion of an optimal service mix.³²

The latter was more the perspective of Metro planners. Because many of the buses were rerouted, it was difficult for Metro staffers to estimate how much was saved financially (#22). For the major alteration

Table 1: 1975

A. Bus-only agencies

1 Agency	2 Fleet Size	3 Administrative and general expenses (in 1000s)	4 Total operating expenses (in 1000s)	5 3 ÷ 4 (%)
Southern Califor- nia Rapid Tran- sit District	2,173	\$ 13,780	\$ 113,872	12.1
Manhattan and Bronx Surface Transit Autho- rity	2,040	25,549	154,080	16.6
State of Mary- land DOT, Mass Transit Adminis- tration	1,043	4,892	41,939	11.7
Metropolitan Transit Commis- sion (Mpls.)	1,013	4,264	33,701	12.6
Bi-State Develop- ment Agency (St. Louis)	1,008	4,994	36,274	13.8
AC Transit	878	<u>5,748</u>	<u>36,938</u>	<u>15.6</u>
Totals		\$ 59,227	\$ 416,804	14.2

Table 1, Continued

B. Multi-modal agencies; bus division only

1 Agency	2 Fleet Size	3 Administrative, etc. expenses (in 1000s)	4 Total operating expenses (in 1000s)	5 3 ÷ 4 (%)
CTA (Chicago)	2,444	\$ 11,978	\$ 200,151	6.0
New York City	2,394	49,313	214,261	23.0
Transport, New Jersey	1,670	14,345	92,570	15.5
Southeastern Pennsylvania	1,411	<u>19,511</u>	<u>82,198</u>	<u>23.7</u>
Totals		\$ 95,147	\$ 589,180	16.1

Source: American Public Transit Association, Transit Operating Report, 1975.

Table 2: 1976

A. Bus-only agencies

1 Agency	2 Fleet Size	3 Administrative, etc. expenses (in 1000s)	4 Total operating expenses (in (1000s)	5 3 ÷ 4 (%)
SCRTD	2,394	\$ 28,787	\$ 173,831	16.6
Manhattan and Bronx...	2,050	27,839	159,389	17.5
State of Mary- land DOT...	1,025	4,892	44,946	10.9
MTC (Mpls.)	1,125	5,524	42,119	13.1
Bi-State Develop- ment Agency (St. Louis)	893	5,849	43,715	13.4
AC Transit		Not Listed		
Totals		\$ 72,891	\$ 464,000	15.7

B. Multimodal agencies; bus division only

1 Agency	2 Fleet Size	3 Administrative, etc. expenses (in 1000s)	4 Total operating expenses (in 1000s)	5 3 ÷ 4 (%)
New York City	2,770	\$ 51,968	\$ 223,132	23.3
CTA	2,377	11,047	219,706	5.0
Southeastern Pennsylvania	1,265	20,704	82,635	25.0
Transport, New Jersey	1,022	<u>15,512</u>	<u>88,017</u>	<u>17.6</u>
Totals		\$ 99,231	\$ 613,490	16.2

Source: Ibid., 1976.

to date, Phase II, Metro estimates range between \$3.5 million (Phase II Proposed Plan, p. 5) and \$6 million³³ (Phase III Transit Planning Study, p. 66) annually.

This completes the record of benefits accruing from merger; we now move on to the other side of the ledger.

Disadvantages of Integration and Monopoly

As with advantages, we must distinguish negative effects of integration per se from those which resulted from eliminating redundant service. We start with the former.

When the bus companies were taken over in 1973, D.C. Transit was in a sorry condition (#7, 29).³⁴ In addition, the route structure of the four systems had become hideously complex, even to native Washingtonians (#8). Indeed, one veteran Metro scheduler candidly told me that "Our routes are so complicated, sometimes even we don't understand them" (#19). In order to revitalize the bus system, strong management was required.

Such management is not impossible in an integrated transit authority. In General Motors-type organizations, e.g., divisions have historically been semi-autonomous, with divisional managers having considerable discretion over important decisions.³⁵ This type of organizational structure was possible for WMATA in 1973. There were two³⁶ variations on this theme: operating the buses by contract management such as the ATE firm, or creating a separate bus division, run out of a different headquarters by a high Metro official (#17). Contract management is employed in several cities in the United States and was seriously considered by the board. Jackson Graham, who took over as General Manager

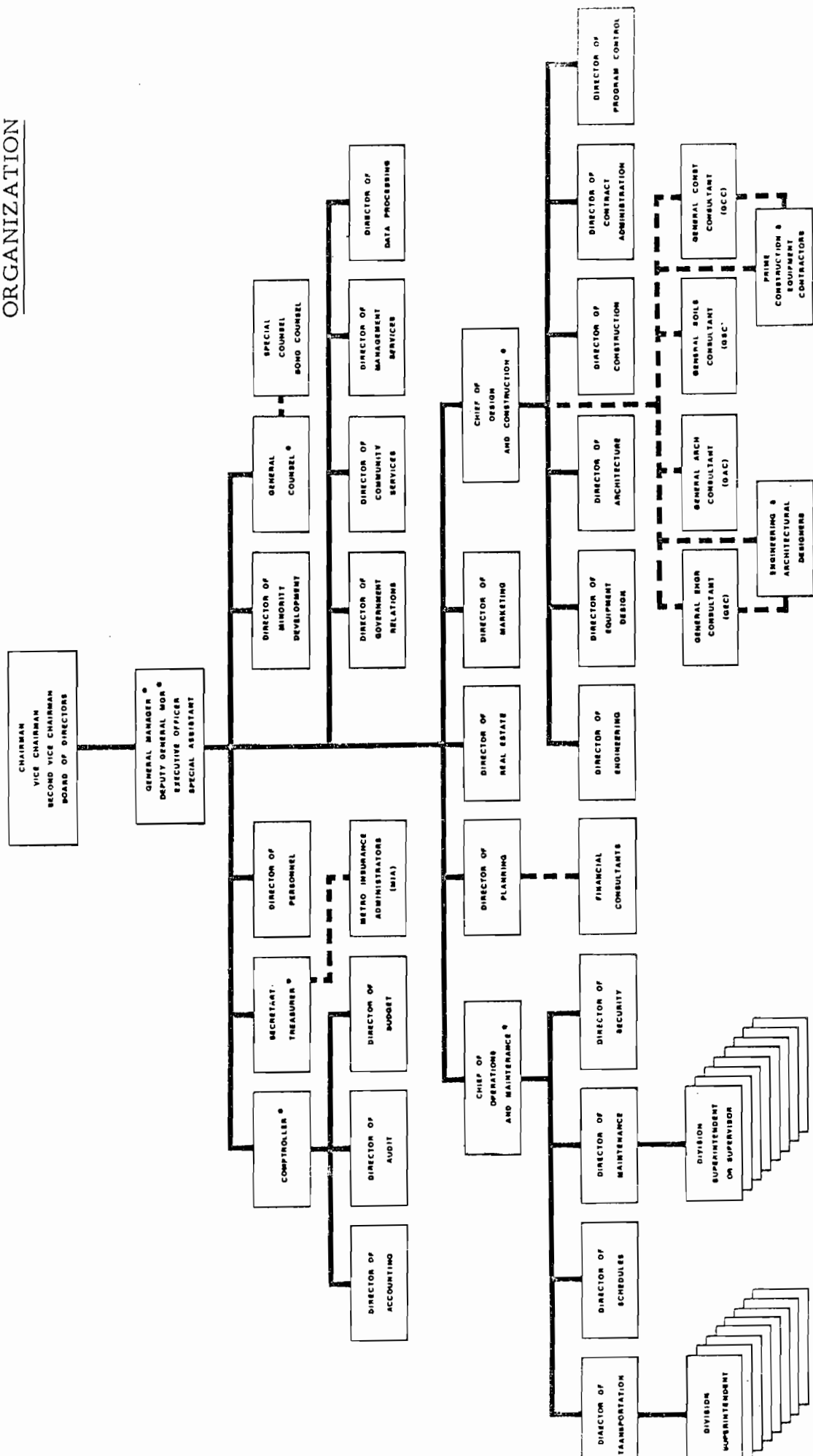
in 1967, was "violently opposed" to the proposal (#15).³⁷ Although neither he nor his top aides had any experience in running a bus system, Graham--by all³⁸ accounts an extremely capable man with a highly successful career in the Army Corps of Engineers behind him--did not lack confidence. In a subsequent interview he said that "I commanded more vehicles and personnel in Korea" (Post, 8/12/76). Contract management, in his view, was unnecessary: Metro management could handle the new task.^{38a} It seems fair to say, with hindsight, that Graham badly underestimated the difficulty of improving the bus system.

The second idea, having Metro officials manage a quasi-autonomous bus division, was not adopted either. Unlike the issue of contract management, which was a matter of public record, the question of which purely Metro structure should be adopted seems to have been primarily an internal matter. It is therefore difficult to sort out how the decision was made. In particular, it is uncertain whether Graham imposed a structure that fit his preferences for a centralized management style (#8, 17), or whether top Metrorail management hashed it out (#13). It does appear that this group generally supported the idea that transit should be an "integrated show",³⁹ and that it would be unhealthy to manage a system that was to be operationally meshed with separate divisions.⁴⁰

In any case, the structure that was chosen (see Chart 1) was far from a divisionalized form. Different responsibilities for bus operations were scattered widely across WMATA's entire structure.⁴¹ There were two mechanisms for reaching decisions regarding bus improvements in this diffuse structure. One was Graham himself. Several interviewees asserted that this structure meant that Graham had to make most of the important decisions (#14, 17). This, not surprisingly, slowed up



PRESENT ORGANIZATION



ORGANIZATION APPROVED BY
WMATA BOARD OF DIRECTORS
NOVEMBER 16, 1971

OFFICERS OF THE AUTHORITY

Chart 1

decision-making. Even Graham, though an extraordinarily hardworking executive, could not keep on top of the increased complexity of WMATA: building a subway, meeting politico-financial problems, and now trying to improve a rundown bus system.⁴³

The second integrative mechanism was a "bus trust" that Graham established in late 1972. This committee was composed of top Metro executives and representatives from relevant bus sections (operations, maintenance). It is not clear how much was achieved by the trust. One bus manager described a similar committee as a frustrating experience; there was inadequate communication between this official and other committee members (#14). Another former Metro official noted that there was "Too much bureaucracy sitting around the table every Monday morning" (#17).

Neither mechanism provided the aggressive leadership and intra-organizational representation of bus interests that was then essential. Graham was too busy elsewhere and the bus trust was too unwieldy. Furthermore, the board of directors was dominated by Graham (#39), and in addition spent relatively little time on bus problems (#19). It therefore provided little direction and could not compensate for the unwieldy bus management structure. Bus maintenance in D.C. remained spotty, and route structure remained Byzantine.⁴⁴

In early 1975 the board requested Cresap, McCormick and Paget to conduct an overall examination of Metrobus, with particular emphasis on escalating deficits and quality of service. With regard to management the team recommended that a new position of Chief of Bus Operations and Maintenance be established for an interim period to ensure an "immediate strengthening" of that mode (Cresap, et al., p. III-4). As one Cresap

staffer recalled,

This organization was getting so into rail, we felt that the bus operation would suffer, and was suffering.... There was no one strong bus person who could get things done, short of going up to Graham.

(#11)

Graham and the Metro staff fought that particular recommendation (there were many non-organizational recommendations they accepted) with determination and skill, producing an "amazingly fast rebuttal" (#17, 11, 12). The board did not accept the recommendation, and the management structure remained unchanged until after Graham left.

This does not mean that patrons perceived no progress in Metrobus. In two surveys of 1000 randomly selected area residents in 1973 and 1975, the system received higher marks in the second study. D.C. residents registered the largest perceived improvements;⁴⁵ in the 1973 study D.C. bus service had scored lowest of the three jurisdictions. Maryland's improvements were considerably less. Virginia's, which had started out highest, showed an interesting pattern with increases in the second most positive category but decreases in the "excellent" and small increases⁴⁶ in the "poor" ratings.⁴⁷

In this period Metro had bettered certain aspects of the bus system. Route mileage increased considerably from 1973 to 1976,⁴⁸ and over 600 new buses were purchased from American Motors in 1974. The buses unfortunately proved to be a poor purchase, compounding maintenance difficulties.⁴⁹ It is uncertain to what degree the poor purchase decision should be attributed to the tightly integrated structure. Certain external factors--UMTA wanted more competition in bus manufacturing and

pressed WMATA to accept American Motor's bid--would have affected any structure, including a more decentralized, divisional one. Further, the position of bus managers at that time was not clear. Today two have said that they were opposed, but if this was so, it was not widely known then (#14, 29). (This was itself a structural problem: if bus managers did believe the purchase was a mistake, they did not have a secure organizational base from which to oppose it.) Again, a union leader recently indicated that whereas under private ownership the union could influence bus specifications, under Metro the union was not consulted (#32). What the union's views were at the time of purchase is unknown.

The bus system was as badly in need of skilled personnel--maintenance men and schedulers--as it was of new equipment, and here the integrated structure worked poorly. Scheduling is an arcane craft that is essential to the economical functioning of a bus system. When Metro absorbed the bus companies it got an aging cohort of schedulers.⁵⁰ New schedulers were badly needed so they could be trained before the old cohort retired (Wilbur Smith report, p. 66; #19). The board, however, proved unresponsive to these budget requests--in one year, curtly so (#14, 19). Apparently the scheduling department received no help from higher-ups, which again points up the advantage of a divisionalized form with modal heads as natural advocates of divisional interests.

The problem of too few trained bus maintenance men was less connected to organizational structure. After merger, maintenance men, like other workers, had the right to move from one mode to the other, and many bus maintenance men moved to rail (#29). Although superficially this might appear to be a symptom of rail-oriented resource allocation and a direct consequence of Graham's centralized, rail-oriented style, it was not. The right to change jobs was exercised by workers, and was not

centrally directed. It could have occurred just as easily under a divisional structure, or indeed if the two modes had been run by two distinct organizations.⁵¹ Furthermore, Metro has tried to hire new maintenance men, a difficult task because skilled personnel are scarce and in great demand.

It is quite possible, however, that some shifts were influenced by a perception that rail was the favored mode in Metro. The union felt that the bus system was a stepchild in the integrated Metro structure. Graham was perceived as autocratic and antilabor, and Metro leadership as remote from the bus system (#32; Post, 10/31/75). The stepchild syndrome was probably inevitable: trains after all were shiny and all-new, buses dirty and mostly old. Indeed, Graham argued that it was precisely in order to break down intermodal barriers that the decision was made not to separate the modes (#7). In the period between merger and Graham's departure (1973-76), however, this does not seem to have been accomplished (#20, 32).⁵² It would have been wiser to recognize that there would inevitably be tensions between workers in the two modes, regardless of organizational structure.

I must stress that the problems adduced above--delays in improving the bus system and feelings of being a second class operation--did not result solely from an integrated structure, but also from the highly centralized version over which Graham presided. When Graham left in early 1976, that structure did not long outlast him. The acting General Manager, Warren Quenstedt, preferred not to so tightly control transit operations, or as many internal issues in general as Graham had.

The key, dramatic stimulus to improve the functioning of the bus system was the July 4, 1976 fiasco, when hundreds of thousands of bicentennial tourists were caught in one of the worst traffic jams in

Washington's history. There were far more tourists than expected and far too few buses. Worse, buses that were available could not move for hours. The board was embarrassed by this failure in a fishbowl. Ironically, although a dramatic stimulus was needed to indicate to the board that the bus system needed betterment (the board had been passive during Graham's ten-year tenure), this particular breakdown was not mainly the fault of either the bus system or its management structure. Crowd estimates were provided by the police, and Metro could not control traffic conditions. But despite the inaccuracy of the attribution of blame, the board gave strong support to a management structure shake-up after July 4.

Quenstedt appointed Nick Roll, a hard-driving Metro lawyer, troubleshooter for the bus system, instructing him to submit a report on bus management. Roll's report "amazed everybody,"^{52a} according to one board member, because it showed "no one knows who's responsible for what" (Star, 7/24/76). The reorganization proceeded despite top management turnover, as Quenstedt was replaced by a former DOT Undersecretary, Ted Lutz, in November 1976. Quenstedt stayed on for several months to help carry out the reorganization, as the plan that the board had adopted was largely his (see Chart 2). We note that, unlike Graham's structure, there is a consolidated office of bus service. Bus functions are not distributed as diffusely in the current organization.

In terms of some of the problems enumerated above--the delays and top management remoteness from operational bus problems--the new structure appears to be an improvement over the old (#32,2). Bus garages have been renovated, buses are cleaner, and so forth.^{52b}

To some degree this improvement is a consequence of personnel



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

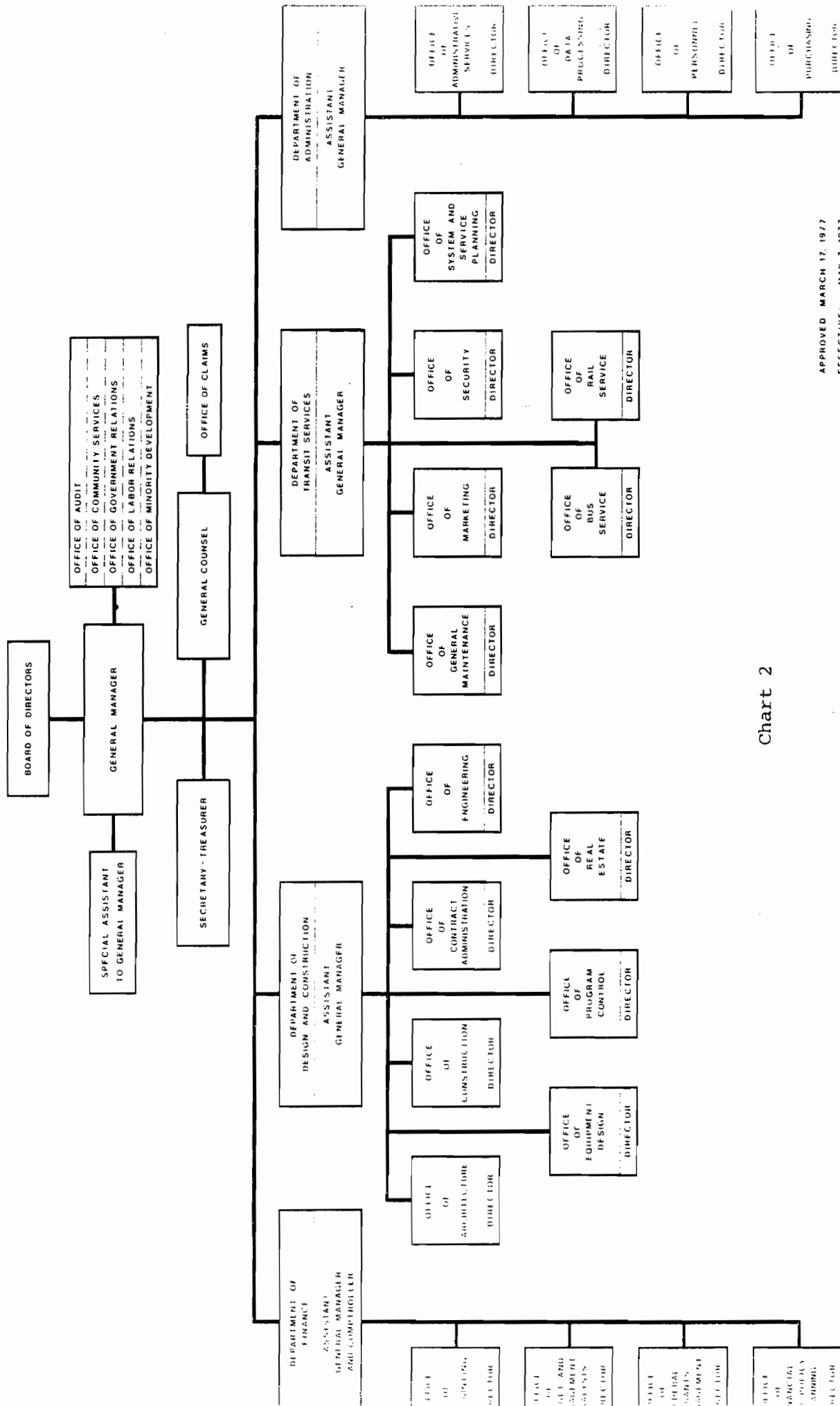


Chart 2

APPROVED MARCH 17, 1977
EFFECTIVE MAY 7, 1977

changes. In terms of solving problems with dispatch, Nick Roll is regarded as far more energetic than his predecessor (#2). Whereas a former bus manager lamented that it was virtually impossible to get much done through Roll's predecessor (#14), I did not encounter such remarks at this time.⁵³ And at the top, Lutz is less construction- and more service-oriented than Graham, and is regarded by the union as having a more evenhanded approach to the two modes (#32).

That differences in personnel counted, as well as structural alterations, indicates that some of the bus system's problems in 1973-76 derived from the timing of merger. In 1973 Metro was deeply involved in constructing the rail system. One expression of that pre-occupation was the background and expertise of its General Manager, who has been described as one of the greatest public builders since Robert Moses. Personnel difficulties were therefore not random but could have been anticipated on the basis of Metro's task involvement at the time of integration. To insert and tightly intertwine an ailing bus system in an organization that had been devoted for ten years to planning and constructing a rail system was a mistake. It probably would have been less of a mistake by 1977, when a new general manager, one neither identified with nor personally invested in rail construction, arrived, and when Metro in general was becoming more service-oriented.⁵⁴

The feeling that buses are a second class mode in Metro has not, however, completely disappeared, as revealed by a recent controversy over security.^{54a} In May 1978 a woman bus driver was raped in southeast D.C., and drivers there went out on a wildcat strike. One of their chief complaints concerned the allocation of Metro security forces: until that time, virtually all of the 160-man force were allocated to

trains and stations, even though there was much more crime in buses (Post, 5/19/78). There were reasons for this strange allocation. Bus security has traditionally (and nationally, not just in Washington) been considered within the local police force's jurisdiction, not the transit agency's. Furthermore, it is more difficult to protect many small discrete buses than a few large stations and trains. So Metro officials argued; the drivers, however, were not appeased.

Because Metro is modally integrated one could centrally allocate security forces between the two modes, which would be difficult if the modes were organizationally separated. The bus drivers' aspirations--concerning security, among other issues--are probably higher in the integrated organization than they would be in a single-mode agency, and the higher aspirations increase dissatisfaction and intraorganizational tension.

As of this writing, however, the security problem on buses has improved. Metro shifted twelve transit police to buses (Post, 6/23/78), arrests increased eight-fold from 1977 to 1978, and "the most serious crimes have fallen sharply" (Star, 12/29/78). The leaders of the wildcat strike were "reasonably satisfied" with Metro management's response (Post, 6/8/78; Star, 6/10/78).

Financial Confusion and Integration

As noted above, integration produces some financial advantages. What would otherwise involve drawnout interorganizational negotiations over, for example, who should bear the fiscal burden of free transfers, becomes a smaller problem of intraorganizational accounting of modes' deficits. The organization's total deficit remains constant. It is not, however, that simple. Each mode operates on an annual deficit

which the political jurisdictions must cover. The formulae for allocating deficits cannot be the same for the two modes. The bus formula is relatively straightforward and is based on estimated costs and revenues of operating in each jurisdiction. Because of the technology each jurisdiction can independently decide how much bus service it wants; service additions or deletions are then reflected in the deficit the jurisdiction must pay. While the rail deficit formula also breaks down charges to jurisdictions, the rail service level cannot be decided in a decentralized manner. Since the train cannot operate in Virginia and not in D.C., the Metro board must collectively decide what the annual rail service level, and hence the total deficit, will be. This means that if jurisdictions prefer different service levels (as they do), and wish to cut service and costs individually, they can do so only by cutting the bus system.⁵⁵ Thus the bus system, as the flexible component, will become the financial shock absorber in Metro. As one board member remarked, "Every time we get into a financial problem we look for bus service to cut..." (Star, 4/7/78).^{55a}

We should observe, however, that had buses and rail been organizationally separated but the political jurisdictions kept program (functional) budgets, the same result might well have occurred. A county supervisor, scanning the budget summary and observing that the county was spending too much on total transit, would soon learn buses are more locally controllable. The modes' technological differences, and ensuing difference in decisionmakers' ability to make decentralized service/budget decisions, probably swamp organizational differences.

Although the political jurisdictions' budget summaries contain a single mass transit entry, it is elsewhere disaggregated into the two modes' deficits. Thus service level and subsidy decisions might also be made on how well the modes appear to be doing individually with res-

pect to deficit operation. Consequently the internal accounting rules take on a new significance: they influence how well each mode seems to be doing financially. For example, I was told that Metro was planning to change the accounting transfers. Previously the free rail-to-bus transfer had been split down the middle; now the bus office would have to absorb all of it.⁵⁶ A Metro planning official said that "Therefore the bus subsidy will increase, and rail subsidy will increase." Question: "Which could mean that more bus service will be cut back?" Answer: "It could" (#4).⁵⁷

Service Monopoly Disadvantages

Integrated organizations need not be internally unredundant; but with respect to service, WMATA is so as a matter of policy. The suburban directors in particular have stressed eliminating duplicate routes wherever possible (#4). The staff has been more cautious; in some instances staffers have pointed out to the board that apparent duplications are in fact lines which serve different patrons (e.g., local and commute). Exactly how much intraorganizational consensus has prevailed on this policy is difficult to discern: I heard that there was vigorous discussion concerning the wisdom of at least the timing of turnbacks (see p. 27; #1). These discussions were seemingly not evident to outsiders, as Metro appeared to take a unified stand on eliminating duplication. Indeed, Metro planners had assumed since 1968 that bus and rail would be complements, not substitutes, so service monopoly was a longstanding idea.

Unlike problems caused by the integrated organizational structure, where we focused upon internal dynamics, disadvantages of service

monopoly draw our attention outside the Authority. The rail opening which resulted in the most substantial bus turnback was Phase II in summer, 1977. As both suburb and city were affected, we can study their reactions to advantage.

When the Blue Line opened, most^{57a} Virginia lines were turned back at rail stations west of the Potomac River, and buses from southeast Washington were turned back at stations on the downtown side of the Anacostia River. At top management insistence (#15, 25), the change was not instantaneous: it took about one month to accomplish all route changes. This gradual staging undoubtedly eased the transition. It enabled Metro to work out some of the interface's bugs and patrons to become accustomed to new travel patterns. But there still were vociferous complaints of two major kinds.

(1) Many poor people live in southeast Washington, and the bus turnbacks abruptly imposed a financial burden on them. They had previously been able to ride from Anacostia to downtown for \$.80 roundtrip; after the turnback they had to transfer from bus to rail (or even bus-rail-bus in some cases) and transit expenses as much as doubled. In addition, the train afforded them little convenience: the ride was not long, and because the transfer station was across the river the buses still had to cross the bridges. This meant that patrons still had to endure the worst bottlenecks of their trips. (A Metro staffer said that some inside the Authority thought that Metro should have waited until rail had crossed the Anacostia before starting the turnbacks (#1).)

The strength of Anacostia's reaction surprised Metro staffers (#9);^{57b} they had underestimated the perceived impact of the increased fare. The complaints quickly reached the D.C. board members, who were

sensitive to the charge that Metro was a system for affluent white suburbanites and offered few benefits to poorer black residents in Washington (Board minutes 8/4/77). The southeasterners' financial hardship was eased when Metro added bus routes which went from transfer stations to downtown: with free bus-bus transfers, passengers paid no more than the old fare. The outcries died down following this modification, indicating that it was indeed the fare hike that mattered most.⁵⁸

(2) In the west the more affluent Virginians appeared to be disturbed more by service changes than by increased fares (#9). The Virginia service, particularly AB&W's, had been good, and now many commuters were forced to transfer to a system which was unproven and initially unreliable.⁵⁹ Complaints peaked in the opening months of August and September (#3T). Metro responded by re-establishing a few through routes southwest of Washington, and, more importantly, by improving the train's reliability. Metrorail's mechanical reliability improved more rapidly than had BART's, and it had another advantage over BART in that it was technically more conservative: trains were designed from the beginning to allow both automatic and manual operation. This technological redundancy permitted more reliable operation when breakdowns did occur. While in July only eighty percent of the train trips were completed without breakdown, by October it was up to ninety-five percent and in January it was ninety-eight percent (Star, 9/25/77 and Metro Office of Rail Services memoranda). As a result of improved reliability and customers growing accustomed to rail and to transferring, complaints tapered off after September⁶⁰ and patronage started increasing faster^{60a} in November and December.^{60b}

When Phase IIa opened the line to Silver Spring, Maryland, in

February 1978, there were very few negative reactions (#1; Star, 2/6/78; Gaithersburg Gazette, 2/9/78).⁶¹ The train did not require a debugging period as it had in Phase II. In fact, the line opened in a snowstorm during which the train performed more dependably than either buses or autos (Star, 2/7/78). And as there was no Maryland-D.C. equivalent to the Shirley Highway, buses had had to slog along congested roads, and the time-saving of rail over bus from Silver Spring to downtown was considerable.

In analyzing these reactions to the (partial) elimination of service redundancy, several points should be made. First, an obvious implication of redundancy theory is that the more reliable one channel is, the less needed are duplicate channels. Metrorail is reasonably reliable. Second, it is clear that there were many commuter bus routes which were not as competitive with rail as AC is with BART. The Maryland routes in particular lack AC's freeway-bus-metered-bridge approach to downtown. We can therefore expect that when Metrorail extends out to Landover and Bethesda, travelers will save time by switching to rail, and as in the Silver Spring opening there will be few protests.

Third, Metro's response to Anacostia's protests to service cutbacks indicates that users of one mode can be heard by an integrated, dual-mode organization. It is not necessary that modal clientele be represented by modally specialized agencies such as AC (see Chapter Three).⁶² WMATA's locally appointed board, and a rule that two members from any of the three jurisdictions constitute a veto, ensure a measure of responsiveness to users' dissatisfactions.^{62a} Metro planners may resent the response to Anacostia as oiling the squeaking wheel, undermining economic rationality, but its political rationality in helping to hold together WMATA's coalition is evident.

Fourth, Metrorail's expansion across the Anacostia River and from Capitol South to the Pentagon should further placate dissatisfied ex-bus riders because the train will help them to bypass former bus bottlenecks. The modal transfer will make more sense to riders. Fifth, if the flash-pass is widely used, it will reduce complaints which are due to the financial hardship imposed by the first bus-rail transfer procedure.

Service Monopoly, Episodic Breakdowns, and Latent Redundancies

The reader will recall that AC and BART can substitute for each other in the event of complete mechanical breakdown. It was conjectured, however, that the factor of separate organizations was not important in this respect because most organizations believe in having reserve capacity (latent redundancy) in case of emergency.⁶³ Thus when part of Metrorail was rendered inoperative by flooding in August 1977, buses filled the gap. This substitution has happened, less dramatically, about twelve times since rail opened (#20) and seems to be routine.⁶⁴ In general, communication between rail and bus operations when the rail system is experiencing difficulties requiring bus assistance^{64a} appears to be quick and easy, virtually a matter of walking a few yards from one office to another (#45).^{64b}

As for the second major category of episodic disturbances, strikes, WMATA has suffered only one that lasted more than a day, a wildcat strike in July 1978. As suggested in the AC-BART chapter, because the workers belonged to the same transit union local,^{64c} a strike closed the entire public transit system^{64d} of the Washington metropolitan area. (Though it was a non-sanctioned strike, it spread from mechanics to bus and rail operators.) Thus simultaneously the integrated structure and monopolistic

service had effects, the former because it increased the probability that all operators would strike simultaneously, and the latter because it meant that even if bus and rail crews did not go out together, there would be no backup for lost service.

Not surprisingly, downtown traffic was reported to be "unusually heavy" during the seven-day walkout (Post, 7/26/78). However, Metro management succeeded in running the trains (at a reduced level) by using supervisors and administrative personnel, so the transit system was not totally disabled. To a degree not anticipated by this writer, internal substitution of personnel^{64e} compensated for not having redundant modes operated by different locals.

The Formation of Local Bus Associations

Dissatisfaction with monopoly transit service can be indicated by complaints, switching to the auto, not traveling--or by contracting with or forming alternative transit organizations. Transit could be supplied, à la Ostrom-Tiebout-Warren, by private or public entities, and being a relatively standardized service users could easily do comparison shopping.⁶⁵ In the Washington area several non-Metro bus services have sprung up in the last half decade. Most of these--dial-a-ride services in Anacostia, Columbia, Fairfax, and Gaithersburg--have failed rather quickly. Two, however, have lasted longer: Montgomery County's "Ride-On" program and the community of Reston's express commuter service.

"Ride-On" was not a response to bus turnbacks and elimination of service duplication; rather it was created because of discontent in Montgomery County over quality of local service and high cost (subsidy) of Metrobus. Smaller, quieter buses for neighborhood routes, and lower drivers' wages were sought. Metro could not provide the latter and

and was not quick to provide the former.⁶⁷ The County started its program in 1976; by buying its small buses without federal aid it avoided the sometimes costly 13-c regulations. Drivers are frequently college students working parttime, and the labor situation is the main cause of the program's success. Should "Ride-On" grow much larger Metro's union local will probably attempt to unionize the drivers (#32), which would wipe out the cost advantage of a county-run system. Since the County already has the buses and route network it wanted, if its drivers are unionized merger with Metro would probably have little further impact on its service-cost package. As a temporary program, however, "Ride-On" has proven a successful alternative to Metrobus (although success--high patronage--has caused equipment to wear out at an unexpectedly fast rate; Montgomery Journal, 3/7/79).⁶⁸

The presence of an alternate organization offering a different set of service characteristics did not appear to have stimulated Metro to offer a similar package, i.e., there was no rivalry effect. But since Metro has to use unionized labor, it is unlikely that it would have offered as attractive a program as "Ride-On" for the same price.

The suburb of Reston had formed an association, the Reston Commuter Bus, Inc., to arrange for special commuter express service. By 1975 the association had concluded the Metro's prices were too high, and determined to contract with a private bus organization, Colonial Transit. Colonial said it would supply the service for \$45 for each bus trip (in addition to fares) as compared with Metro's \$66.91 (Post 9/6/75). Metro opposed the change, and the dispute went before the Transit Commission as it was an interstate affair involving a private carrier. In September 1975 the Commission decided against Metro and allowed the Reston association to contract with Colonial. By early 1979, however, there was a

growing number of complaints about Colonial's service (Post, 1/12/79), and in March Reston ended the contract and rejoined Metro.^{68a}

Notwithstanding the difficulties encountered by Reston and Montgomery County, there are rumors that the Virginia counties will eventually form their own bus agency and withdraw from Metrobus (Post, 7/31/78; #39), mostly in an attempt to reduce the bus subsidy. But such rumors have persisted for several years without materializing, and it remains to be seen whether they will ever do so.

Conclusions

I expected to find in Washington that the central issue would be the service (route) relations of the two modes--problems and benefits associated with turnbacks and so forth. This was in fact a heated issue, as officials' reactions to questions clearly indicated. But I now believe that a more important problem concerned not service monopoly but the organizational structure which administered the service. I had anticipated that the two modes would be managed by two divisions; the somewhat chaotic organizational situation that existed from 1973 to 1976 was a surprise.

As argued above, the difficulties that resulted from dispersed modal authority were not an inevitable product of merger⁶⁹ but of Jackson Graham's management style. This conclusion is not theoretically pleasing, because the leader's administrative strategy is a quasirandom variable. It is not completely random, however, because Graham personified and amplified Metro's organizational attention to the task of building a rapid rail system; one could therefore predict that a merged organization which he led would have that orientation. But this orientation would

also have been consistent with establishing a bus division with the capacity to energetically renovate the bus system. Indeed, given the understandable preoccupation with rail, and the reluctance of the top Metro management in 1973 to assume responsibility for buses, one might well have predicted that they would have preferred to set up an operationally autonomous division. The tightly intermeshed management structure which did emerge was not solely the predictable consequence of Graham's idiosyncratic predilection for tight control even over matters that were not central to him.

The negative management effects of merger have been reduced by the 1976 reorganization and Lutz's redirecting Metro towards operations, although certain problems, such as the excessively complicated bus route structure,^{69a} persist.^{69b} The timing, however, has not been ideal. It would have been better had the structural sequence been reversed, i.e., the bus system's management can better afford now to be closely intertwined with rail than it could in the years immediately following merger.

Regarding the fiscal effects of integration, it will be some time yet before these have been sorted out. Indeed, one of the negative effects of integration here is that it is harder for outsiders to know how the two modes are doing financially because of the complicated internal accounting rules and subsidy schemes.

Regarding service, it is clear that, as hypothesized in Chapter One, duplication is held to be illegitimate except by the direct beneficiaries of duplication, i.e., the would-be users of parallel bus service. While there was no norm inhibiting the private bus companies from competing with or opposing NCTA, as soon as buses went public there was little support for establishing an independent agency which would compete with WMATA.

It was not the technical efficacy of redundancy that was questioned so much as the allocative:⁷⁰ given tax-supported duplication, the board believed duplication meant more service than was warranted.^{70a} The board, in particular the Virginia component, has been as concerned with representing local taxpayers as much as transit users. I conjecture that the enthusiasm for eliminating service redundancy is directly related to the jurisdiction's fiscal properties. In Virginia, which relies solely on the sensitive property tax, there is most concern; in D.C., which receives more federal aid for transit, there is least concern.

Given the financial or allocative basis of the board's anti-redundancy policy, it is odd that the monetary gains from creating service monopoly are as uncertain as they seem to be (p.196). This suggests that eliminating parallel routes was as much symbolic fiscal politics as substantive--although it is understandable that the board would assume that there would be considerable savings and that it would be unaware that staff figures published in reports were subject to a large margin of error.

Regarding the negative effects of service monopoly, I believe the worst is over. (1) Metrorail's period of chronic unreliability was brief, and there is no reason to believe that it will recur. (2) The most inconvenient turnbacks, where buses had to traverse the worst bottlenecks to reach transfer stations, will be eliminated as rail extends further into the suburbs. And the longer the ride, the more the train's speed advantage will payoff. (3) The pain of added fares on bus-rail transfers will be lessened by flashpasses. Routing inconveniences may persist, however, particularly in D.C., where some riders have to take bus-rail-bus where once they could take one through bus.

There is the unanswered normative question of whether transit patrons should have been allowed a choice between modes. I think it fair to say that an unrestrained rule of user sovereignty is not justifiable for nonself-sustaining services. Conventional opposition to public redundancies that rests on this fiscal principle does have a case; non-using taxpayers must be represented as well as users. The problem in Washington is more of distribution than of undifferentiated consumer sovereignty; eliminating service redundancy probably hurt inner city residents disproportionately.

The Long View

Transportation planners or economists blessed with a long time perspective may suggest that this chapter's focus on service monopoly misses a key point: the process's critical period was during the sixties, before construction. It was then that the fundamental choices of mode, system size, and financing were made. If buses were ever to have provided a feasible alternative to rail it would have had to have been in that period, not during the operational stage (Hamer, p. 112).⁷¹ At the very least, choice between modes should focus on extensions of the system, not on the already built portion (Haefele, 1976).

But even if we take the long view, and examined the potential of buses versus rail in the sixties, it is doubtful that a different outcome would be reached. The highway configuration, more precisely the lack of highways in the Washington area, make buses an entirely different proposition than in the Twin Cities or the Bay Area. Without an expansion of highways, it is unlikely that buses would have been an acceptable alternative to transit users. But it is equally unlikely that a highway expansion would have been acceptable, given the threat they posed to

residential areas. Finally, it is unlikely that taking away existing lanes on highways and D.C. streets from automobiles and giving them to buses would have been politically acceptable. Given these constraints, it is doubtful that there was a feasible bus solution. Consequently, the fact that intra-transit planning competition was weak, the bus companies being more concerned with protecting their property rights than developing detailed alternatives, was not very important in the long-run. Even if the bus companies had folded in the early sixties and had been taken over by a public bus agency which would have provided more planning competition, I doubt that the final outcome would have changed in terms of basic system configuration and modal mix.

Having completed the case study chapters, we now proceed to the comparative analysis of Chapter Six.

Footnotes

¹The official title of the organization is the Washington Metropolitan Area Transit Authority (WMATA), but it is usually referred to as Metro.

^{1a}With the passing of the interstate compact in 1967, the National Capitol Transportation Agency (NCTA) dissolved and WMATA began. There was complete staff continuity.

^{1b}For example, in 1963 Senator Wayne Morse said that Chalk was living up to promises he had made to Congress (Star, 10/10/63).

²Of course, AC had the advantage of nonfarebox revenues.

³AB&W, a much smaller company that served part of the Virginia suburbs and ran commuter lines into D.C., had an excellent reputation comparable to AC's (#8, 12; 1973 Takeover Hearings).

⁴There were also fifteen miles of improved commuter rail, fifty-two miles of express bus operation, and fifty miles of freeway.

⁵NCTA and D.C. Transit appeared originally to have been on fairly cordial terms. This broke down after several months; it is not clear why. NCTA chief Stolzenbach stated that after his organization displayed little interest in Chalk's idea for a monorail, Chalk cut off contact. The bus companies counter-charged that NCTA did not try to contact them.

⁶See also Chalk's skeptical testimony regarding the profitability of reorienting (p. 265).

⁷The different financial assessments may have been partly due to different expectations of the highway program. NCTA at that time was strongly anti-highway and its planners probably assumed that if Congress passed its bill the D.C. highway program would not go through. This

would mean worsening traffic conditions for the buses, and as one NCTA planner put it, "the most serious threat to financial stability of the bus companies isn't rail but increasing downtown congestion" (1963 supplemental Hearings, p. 14). The bus owners were probably banking on the highway program relieving congestion.

⁸WMATC leadership may have genuinely believed that buses were the superior alternative, but there was the additional factor of organizational interest. A regulatory commission is only as important as its domain, which would have been diminished by the appearance of a public rail agency over which it would not have jurisdiction.

^{8a}Although the Wohl report was never officially released by the Commerce Department, it was widely circulated informally (Star, 7/21/63; Post, 7/28/63). In his analysis of transit planning in Washington, Andrew Hamer overstated how buried the report was. I doubt that official release of the report would have had much difference.

⁹This assumed that transit was to be financially self-supporting.

¹⁰In a sense rail and bus were on equal footing since both required capital-intensive construction projects. At that time--1963--the idea of using ramp metering with preferential access for buses had not been broached. I am also not sure how many roads/highways would have permitted its use.

^{10a}The D.C. Highway Department had expressed interest in bus-on-freeways as "a key part of mass transit" as early as 1961 (Post, 3/12/61), but it had neither the authority nor the expertise to do combined highway-mass transit planning.

^{10b}WMATC's planning resources were quite meager at this time: the position of Urban Transit Planner was not filled until 1969.

¹¹The 1963 bill did not say who would operate the system, but the bus owners claimed that it implied a governmental agency would.

¹²These included Judge Howard Smith of Virginia (#17).

¹³Especially in Virginia, where the road people appeared to have little truck with buses (#14). In general there was an asymmetry in the highway-bus relation: the latter needed the former but not vice versa. The bus systems consequently had the disadvantages of being associated with the highway coalition in terms of making enemies and relatively few advantages because highway agencies were not interested in transit.

¹⁴Although AB&W did not oppose a purely intra-D.C. system.

¹⁵Deen (1974) points out that where recent large systems needed voter approval, they were not proposed incrementally (by corridors).

¹⁶"Balanced" is a code term familiar to students of weapons systems: a balanced weapons system is one in which there is something for all the rival armed services.

¹⁷The other bus companies did not make presentations at this hearing.

¹⁸One veteran of this period described the second strategy as Chalk's fallback position (#17).

¹⁹What tack the other bus companies were taking at this time I do not know. D.C. Transit was the only one making a strong pitch for managing the rail.

²⁰The planners added the caveat that "complementary radial service" would be maintained (p. 13). The definition of complementary radial service was a trifle vague.

²¹Undoubtedly a greater political security and legitimacy were potent factors in producing the shift from 1965 to 1968.

There had been a "declaration of policy" against "unnecessary duplicating service" in the 1967 WMATA Compact (Section 55), but the modifier "unnecessary" renders the expression vague.

²² Respondents inside and outside Metro agreed on this point.

²³ The Fairfax County executive director was eventually fired for going against official County policy for a regional system by lobbying in Congress for a Virginia takeover. I believe that there was internal division on the county board of supervisors over this.

^{23a} Newspaper discussions and hearings suggest that most participants took for granted that a unified transit system, within and between modes, would be beneficial.

²⁴ WMATC had always been purely a regulatory body, and there is no evidence that it ever sought or was ever considered as a candidate to operate the buses.

²⁵ A transit consultant, S. Swain, warned that the bus systems required many improvements which went far beyond coordinating with Metro-rail (Bus Systems Acquisition, p. 1970-71).

²⁶ No one mentioned economies of scale.

²⁷ There was still another change, that from private to public organizations. This shift had its own set of consequences; the most obvious benefit was the injection of nonfare box monies.

²⁸ The converse proposition, that separate bus and rail organizations would agree to eliminate parallel routes. was less probable. It is unlikely that a bus agency would have unconditionally pulled off all duplicate routes. It is more likely that it would have employed a load or revenue criterion and eliminated runs that were faring badly.

^{28a} There had been some concern in Metro that the poorer riders would not frequently buy the flashpasses (#4), but that does not

seem to be a major problem (#43). However, it is still too early to assess its effects.

²⁹But this was not true for the express buses which BART contracted with AC in eastern Contra Costa County.

³⁰This problem was not anticipated and proved to be a drain on the supervisory resources of the bus office (#20). But the fact that a single organization was in charge of ensuring that the change to a bus-rail system went smoothly meant that the bus section could be authoritatively required to attend to the problem.

^{30a}Though note that Amtrak and Conrail have similar arrangements on an interorganizational level with Metro (#45).

³¹In the sixties it was expected that seventy percent of the a.m. rail patrons arrive at the stations by bus.

³²A Fairfax County staff report envisaged using a service variable--travel time--as a decision criterion regarding when bus service should be cut back. This might have produced intraorganizational competition. It was not used by Metro.

³³There was considerable variance in the confidence the jurisdictional staffs had in Metro figures. A Virginia staffer thought Metro was producing "funny numbers" with regard to turnback savings, i.e., overestimating (#2T). On the other hand, a Prince George's staffer thought there were "tremendous savings" (#4T).

³⁴The suburban lines, particularly AB&W, were in better condition. The relative quality of the different systems was indicated by the fact that D.C. residents were hoping for improvements, while the Virginia commuters were fearing quality degradation.

³⁵They are of course financially accountable to headquarters.

³⁶I was told there were quite a few others in addition (#17), but have gotten specifics on only these two.

³⁷The top bus personnel brought in from primarily D.C. Transit opposed contract management because that would have imposed a career mobility lid on them. It was Graham's opposition, however, that was the key.

³⁸Not one newspaper report or interviewee, inside or outside of Metro, said that Graham was anything but highly capable.

^{38a}It is interesting that Bill Stokes, certainly no opponent of service integration in his day at BART, regarded Metro's decision not to use contract management as a mistake (interview, May 12, 1979).

³⁹As one Metro official earthily put it, "Give 'em the same men's room; let 'em piss together."

⁴⁰In addition it was believed that it would have been wasteful duplication to have separate treasurers, etc. (#3). This would not, however, have been necessary in a divisional organization: administrative posts which are not operationally specific could be centralized.

⁴¹This kind of decentralization should not be confused with a decentralized competitive system. In Metro many officials had had different but interdependent tasks regarding buses: they were not substitute channels, but complements.

⁴²(Deleted)

⁴³Graham may have also made an error in judgement with respect to which bus managers he did pay attention to. He seemed to have largely ignored the man--a former AB&W official--whom outside transit observers described as the most competent former private manager retained by Metro. Observers noted that there was friction between the old D.C. Transit hierarchy and former Virginia bus managers (#39).

⁴⁴The question of delayed route improvements was not just a product of structural impediments. The top Metro planning staff had decided that to change the bus routes twice, one in 1973-75 and again in 1976 when rail opened, was a waste of time and would be unsettling to patrons. This is certainly defensible, but one wonders what position a strong bus division head would have taken. This problem involves a balancing between the interests of the bus-only patrons, who would have benefited from a route rationalization, and rail-bus patrons, for whom a delay would have been acceptable. The representation of these interests was affected by the internal organization of the modes.

⁴⁵The dimensions were: routes availability, schedule frequency, promptness of arrivals, fares, safety on buses, cleanliness of buses, skill of drivers, and drivers' courtesy.

⁴⁶In seven out of seven and four out of seven dimensions, respectively.

⁴⁷If one assumes an interval scale and averages the scores by equating excellent = four, good = three, fair = two and poor = one, then there is a slight overall improvement from 1973 to 1975.

⁴⁸With it had risen the deficit, from \$2.2 million in 1973 to \$51.8 million in 1976.

⁴⁹In addition outside observers questioned whether expanding the system in terms of routes and buses was the appropriate strategy at this time. The route expansions superimposed a new level of complexity on an already overly complicated route structure, and the new buses exacerbated the maintenance problem. But there is no direct link between these two improvement strategies and organizational structure: I believe the bus officials themselves disagreed which strategy was appropriate.

⁵⁰This is a nationwide problem.

⁵¹E.g., when BART opened, AC workers received high priority under clause 13-c in applying for BART jobs, and a number did shift.

⁵²One is reminded of Samuel Huntington's proposition that one cannot decrease armed services rivalry by integration, but only by stimulating crosscutting cleavages (1961, p.51).

^{52a}Why his report amazed everybody is puzzling, since the board-authorized Cresap report had warned of similar problems over one year before.

^{52b}One veteran board member, long critical of Metro management's handling of the buses, considers the bus system to be now in adequate shape (#39).

⁵³Critics of Metro have implied that this lack of detected blockage from the bus managers up to the assistant general manager for Transit Services is due as much to the fact that the bus managers are not initiating many suggestions as it is to the fact that the AGM is more responsive. The Washington papers have noted that the bus managers are fairly old, and set in their D.C. Transit ways; though competent, they are not inclined towards the strong leadership the bus system needed. If this is accurate, it is a problem outside the analytic scope of this study, because it is not primarily a structural difficulty of the organization of the two modes. Had an independent bus authority been established, it is likely that the same group of D.C. Transit managers would have predominated (#14).

⁵⁴Metro planners would probably argue that integration was needed in that period (1973-77) to plan interface coordination. I doubt that organizational integration was a necessary condition, though it facilitated coordination planning.

⁵⁴aIn addition, bus-rail antagonisms were one of the three most prominently mentioned issues in a Post interview conducted after the wildcat strike in July 1978 (Post, 7/29/78).

⁵⁵Most of the political jurisdictions have a category in their budget summaries of "mass transit subsidy costs." If that appears too high to a county supervisor, he will quickly learn that the only way he can reduce it is to cut Metrobus (#3T, 4T).

⁵⁵aOf course, cutting bus service is only one method of decreasing operating deficits. Probably the most important question concerns the rate of fare increases. One group, well-articulated by former board member Joe Wholey, presses for increases to match inflation, and for a separation of efficiency pricing (fares) and equity considerations (selling flashpasses at reduced rates to the poor). The hold-the-line group, usually the D.C. contingent, wants to keep the fare increases to one-half the Consumer Price Index increases. For other Wholey suggestions that do not use the bus system as the financial shock absorber, see the Fairfax Journal, November 15, 1978.

⁵⁶This change was opposed by several staffers because they believed that a free transfer was a system benefit, not attributable to any one mode (#37). Several of the suburban board members also opposed the change, but it was one item of a compromise package which the board passed five-to-one (board minutes, 4/6/78).

The D.C. Department of Transportation is also unahppy with the new arrangement, being apprehensive that the cost of absorbing the free transfer--and consequently the burden on the bus system--will continue to grow (#43).

⁵⁷I have been told that there is no non-arbitrary method in economic price theory to decide how to allocate revenue to complementary services

such as a bus-rail trip. If that is so, then the decision must either be negotiated, as it was between AC and BART, or mandated; it cannot be a solution that is empirically established.

Because there are two distinct deficit allocation formulae, revenue for each mode must be computed. Interdependence of complementary service makes it difficult to do this objectively.

^{57a}According to Phase III Plan (December 1977), fifty-nine routes (forty-three percent) continued to go through, though many of these with decreased frequency. I am uncertain whether this figure is accurate, because interviews and newspapers implied that a higher proportion were turned back. A Metro routing planner guessed that one-third of the Virginia lines continued to go through (#41).

^{57b}A Metro marketing supervisor who has handled consumer complaints observed that Anacostia riders are usually quite passive; hence the surprise when they reacted to the Phase II changes (#40).

⁵⁸It puzzled me that Metro elected to install back-to-back routes rather than instating the old throughroutes. When I pursued this question I was informed that this was done in order to preserve the policy of no duplicate routes--at least in appearance.

⁵⁹The transfers were often none too comfortable because the stations, escalators, ticket machinery and faregates had been designed for train headways of two minutes; with a six-minute headway, the trains in the afternoon dumped larger pulses of people than the equipment had been designed to handle. Bottlenecks resulted. To make matters worse, some of the ticket and gate equipment were initially unreliable.

⁶⁰This is as reported by the newspapers and local Virginia transportation staffers. Metro keeps some records on customer complaints, and I

had hoped to check the newspaper accounts and human memory by constructing a trend line from Metro data. Unfortunately, I was advised that the data are not considered very reliable (#40), and furthermore two critical months (October and November 1977) are missing. However, I was informed by the same official that the complaints regarding rail delays have definitely diminished, which would lead one to infer that complaints regarding the forced shift from bus to rail would also have declined.

^{60a}Of course, I cannot say how many trips would have been made had the parallel lines been maintained.

^{60b}While total transit ridership increased 2.64 percent from July 1969 to July 1977 (the month before turnbacks started), the increase from August to August was only 0.23 percent, September was only 0.39 percent, and October 1977 was 0.83 percent less than a year earlier. But November was up 1.11 percent, and December up 2.13 percent (Metro Patronage Report, March 1978).

⁶¹Though there were some complaints emanating from the Brookland area of D.C. (Washington Afro-American, 2/25/78; Board minutes, 3/9/78).

⁶²The federated political structure also on occasion permits a differentiated response to the turnbacks. For example, at the Minnesota Station opening in 1979, the D.C. government improved bus service to Bennington, while at the nearby New Carrollton station the Prince George's County government gave transit riders much less choice (Post, 12/3/78).

^{62a}Less than one year after the Anacostia complaints erupted, the D.C. government requested that a study be conducted of Anacostia bus service. The study indicated that service was inferior, particularly in mid-day (Post, 6/23/78), and Metro beefed up some of its runs. The

jurisdictional governments are available and relatively visible alternative influence channels; transit users that do not receive satisfaction from Metro can try their local government.

⁶³Whether the reserve of a single organization is sufficient for worst case emergencies is another question.

⁶⁴I do not know how formalized this arrangement is. Apparently in at least one case extra buses were informally stashed in reserve by the bus office (#20).

^{64a}Thus far the communication is not reciprocal: the bus section rarely contacts the rail. For obvious technological reasons, the rail system cannot come to the aid of the buses when the latter suffer from episodic breakdowns. The technological differences between bus and rail swamp the differences in organizational structure between the AC-BART and Metro situations; the assistance tends to be asymmetrical in both cases.

^{64b}But a Metro official observed that similar assistance arrangements obtained between the organizationally and spatially more separated New York subway and bus divisions. A phone call suffices for these also.

^{64c}Metro management had used court pressure to induce a merger of independent locals in the early seventies because it feared contract "whipsawing"--each local trying to outdo the contract given to a rival (Washington Star, 7/20/78).

^{64d}This excludes taxis, of course.

^{64e}This indicates a vertical redundancy of skill. This dissertation has emphasized horizontal rather than vertical redundancies.

⁶⁵This search for alternate suppliers of bus service is generally an instance of organizational competition rather than service redundancy since it is a question of which organization shall supply the only local

bus service, rather than multiple suppliers providing parallel service.

⁶⁷Metro will, however, negotiate with the jurisdictions for different quantitative levels of service.

⁶⁸We should note that unionization is unrelated to the issue of bus-rail merger. Had the bus firms been formed into an autonomous bus agency, it of course would have been unionized.

^{68a}Reston had difficulty in shopping around for alternative transit suppliers: no other charter company expressed an interest in supplying daily commute service (The Reston Times, 1/15/79).

⁶⁹That the policy of nonduplicating service was unrelated to the modes' management structure is corroborated by the fact that the reorganizations went into effect without having the slightest effect on that policy.

These two variables were not completely unrelated, however, because had Metro established a quasi-independent bus division which would have improved the bus system more rapidly, there probably would have been more negative reactions to the elimination of parallel bus routes because the buses would have been more competitive in terms of service quality.

^{69a}Even the Post, long a supporter of Metro, recently lamented, "Bus routes, fares, and schedules are known only to certain native Washingtonians, who learned them from the griots over the generations" (4/19/79). The lack of a bus route map continues to be a sore point between Metro and D.C. Department of Transportation, with the former stating that it is too difficult to produce a map when the system is rapidly changing (#41), and the latter arguing that it is precisely when the system is in flux that riders need maps the most (#43).

^{69b}A veteran transit activist and rail backer remarked that "Metro still had got a lot of problems with its bus system . . . operating things that other organizations can do (with one hand) tied behind their backs . . ." (#46).. He also agreed, however, that matters had improved after Lutz took over.

⁷⁰Unlike planning redundancies, where the efficacy is in question, it is obvious that operational transit redundancies work.

^{70a}In addition, some of Metro's critics, such as the D.C. Gazette, believe that the board eliminated modal competition to ensure that rail's patronage figures looked adequate.

⁷¹But transportation economist Gabriel Roth has suggested considering, even after rail opened, turning the system into busways (Post, 7/31/77).

CHAPTER SIX

Introduction

This chapter is organized in the following manner. First, I compare the different organizational structures underlying transit planning in the three metropolitan areas, and examine how the different structures influenced the process and outcome of planning. I also briefly contrast competitive planning with the model of decisionmaking incorporated in UMTA's alternatives analysis. Second, I compare the operational redundancy of AC and BART with the operational monopoly of Metro to examine the advantages and disadvantages of those arrangements. Third, I compare the effects of variably-timed redundancy on decisionmaking, i.e., the different effects of competitive planning and redundant operations.

The three sections being short, I summarize them collectively at the chapter's end rather than at section endings.

A. Planning Comparisons

There are two major questions to ask about any transit planning. First, was a "correct," or at least a satisfactory, decision made? Second, how rational was the planning process itself? Was a substantial range and number of alternatives investigated, were they evaluated fairly, were planning estimates accurate, and were plans modified in the light of new information?

The criteria of outcome and process must be kept distinct. Because of exogenous factors beyond an organization's control, sensible

planning may produce unacceptable outcomes and mediocre planning may (though less frequently) produce satisfactory ones.

The Search for Alternatives

As noted in Chapter Two, the amount of effort devoted to designing major system alternatives is at the heart of planning. If the design of alternatives is biased, given short shrift, or is otherwise faulty, little else accomplished in planning will matter.¹ Of course, an organization can influence the final outcome through other ways than skewing the alternatives. Even if there are several genuine alternatives, the ex ante evaluation could be biased to make one option seemingly dominate others. But it is harder to do that, once an array of genuine alternatives has been made public to a wide set of authorities, than to skew the design of options in the first place. The former is more visible, and more risky.

In the oldest of the three cases, search was most circumscribed. BART planners quickly moved to seriously considering only rapid rail systems. AC contemplated more options, both rail and bus, but that was largely because it was taking over the Key system, which had been multimodal. Thus AC's early behavior reflected not so much a search for alternatives as it did a simple takeover orientation. In any case, AC's early multimodal position was soon whittled down to a single mode after the CPUC approved the Key System's request to abandon its trains.²

In Washington, the picture was more complex. Transport alternatives design was initially (1959-63) more sequential than simultaneous.³ The heavily criticized Mass Transit Survey's highway-oriented plan was replaced by the rail-oriented NCTA design. The NCTA solution was in

turn accused of having paid insufficient attention to the express bus solution (Wohl, 1963, cited in Hamer, 1976). Search was perhaps most evenhanded in the 1959 study. Though community reaction indicated that it included too many freeway miles, it was not faulted for having completely overlooked other options. NCTA's 1963 proposal, which unlike the earlier plan contained detailed modal designs, was criticized for having treated the express bus option unimaginatively (Hamer, p. 105).

The most thoroughly examined alternative to rail was, of course, highways, but after 1963 NCTA lost the authority to review highway projects. The resulting planning fragmentation produced neither an information-generating planning competition⁴ nor investigations into new options. Instead the conflict focused on financing. Eventually both sides grew willing to mute their opposition to enable both alternatives to go through.⁵ Thus peace was achieved at the cost of highway and rail no longer being regarded as substitutes. (The "radical" wing of the rail coalition regarded that as a sellout.) This logrolling among advocates is at the taxpayers' expense;⁶ the total financial pie for transportation projects is expanded to accommodate all major alternatives.⁷

Similarly, the intra-transit conflict between rail and bus advocates was resolved by a property rights protection clause in Congressional bills, rather than by evaluating which was superior. Here even criticism was rarely more than superficial. For example, though the bus firms argued that rail was unnecessary, given the Washington area's density, they presented no counter-estimates of future transit demand.

There is thus no guarantee that a policy conflict that could potentially become a full-fledged battle over options will actually become one, or that it will not be settled politically, i.e., by interagency

negotiation (collusion) smoothing over the rough edges of competition. It may be that this political resolution eases "frictions" between different units of government. (The Washington Post, during the most intense conflict between rail and highway proponents, editorialized that "The incessant snapping and snarling among the city's transportation agencies is a reproach even to our standards of local government" (5/7/62).) But intergovernmental calm was purchased at the price of serious critical evaluations.

The Twin Cities

The most comprehensive search, in breadth of alternatives covered, was the first Metropolitan Transit Commission study. Even without competitive planning MTC's studies were more thorough than those in the other cases.⁸ In part this was a function of time: transit planning had become more sophisticated between the days of AC and BART planning in the fifties and the Minnesotan planning in the late sixties. Moreover, the planning teams may have been more open-minded in Minnesota than elsewhere.

Competitive planning did not expand the breadth of search over what MTC had done. Both Ed Anderson's Personal Rapid Transit group and the Metro Council's planning covered alternatives that had been examined in the MTC's first two studies. Rather, to use the decision tree image, they increased the depth of search.⁹ Highly innovative options such as Personal Rapid Transit had been scrutinized only cursorily, and dismissed, by the Voorhees report. (Although MTC's second report covered it in more depth.) Options such as these, which simultaneously have a potential for large service improvements (indicated by the large differences between conventional transit's fixed origin-destination design and Personal Rapid

Transit's automated, flexible origin-destination pattern) and much technical uncertainty merit more careful examination. It turned out that even the staid bus alternative had more possibilities than the early reports had indicated. In 1970, for example, bus ramp-metering was dismissed with the remark that "the concept is untried, and a host of engineering, operational, and institutional problems are foreseen" (Voorhees Technical Report 3). Yet ramp-metered express buses proved successful.

Although much competitive planning appeared to be going over issues already covered (and this was generally MTC's attitude), this was true concerning only the major branches of the decision tree, not the fine details.¹⁰ The (normative) problem is that it is difficult to estimate the value of search further down a path.¹¹ After the fact it is easy, misleadingly so, for an observer to note missteps and missed opportunities. In all fairness it must be noted that the Voorhees report's conclusion on PRT systems in 1969, based on a shallow search, turned out to be substantially correct. If not completely correct, it was the same conclusion reached by the much deeper investigation of the last advanced technology report six years later. So to point out, ex post, that other branches were underexplored overlooks the tenable guesses and that they were guesses about the value of exploring further. Nevertheless, largely because actors estimated the utility of different paths differently, Twin Cities transit planning had great breadth and depth (comprehensiveness).¹²

Iteration in Planning

In addition to comprehensive search, transportation planning textbooks also prescribe iteration. Changes in task environments

(whether changed preferences of publics or new factual premises) should be incorporated into new plans. Redesign indicates that planners have elected or been induced to reconsider their original conceptions, and to regard them as tentative. If plans remain unchanged throughout the process, it could indicate that the planning is a sham in which the final design is predetermined,¹³ and the technical studies mere gloss on a process determined elsewhere.

In the AC-BART case, where mutual planning isolation was quickly secured, neither organization affected each other's designs, with the exception of AC's becoming an all-bus system after its CPUC defeat of 1957. After that, AC's design changed little. BART likewise wound up with the technology envisioned from the beginning (Parsons, et al., 1956). It did subsequently adapt to community preferences on track location, station site, and, most importantly, system size. The system's basic configuration was set by bond election. Subsequent modifications were rather marginal and achieved only by dint of considerable effort of well-organized communities.¹⁴

In Washington's somewhat more competitive environment, planning displayed considerable flexibility. Modal composition changed dramatically from 1959 to 1963 (though it stabilized thereafter); later, system size and routes changed considerably. The latter sequence of changes did not register organizational learning of community preferences, but rather the loosening and tightening of fiscal constraints imposed by Congress. Flexibility in Metro planning therefore primarily resulted from a traditional supersubordinate relation which, unlike competitive planning, changed the system's size but not the technology and ensuing service strategy.

Only in the most competitive environment of Minneapolis-St. Paul did the final system not bear close resemblance to the original designs. The expanded but noncapital-intensive bus system of 1976 had not been sought by any of the three major planning groups in 1972. The closest, the Metro Council, had first envisaged fairly expensive busways to control the traffic environment of buses.¹⁵ The final choice was clearly not predetermined by a technical planning apparatus which had already made a decision. Unlike the other two cases, where the basic (modal) selections were made quite early, in Twin Cities planning was permeable, open to influence for almost four years. The process was sufficiently flexible to incorporate revised estimates of regional population and financial capacity, two key planning premises.¹⁶

Planning Differences and Outcomes

Of course the ultimate pragmatic test of an organizational structure is the effectiveness of its programs, not the type of procedure followed. What can be said about the relation between the structures for planning and appropriateness of the systems produced by those structures?

(1) In Washington, though intra-transit planning competition was weak compared to Minnesota's (in terms of substantive alternatives generated), though the amount of serious scrutiny of noncapital-intensive options was likewise lower, and though the Washington area wound up with a far more expensive transit system than did the Twin Cities, we cannot easily conclude that the choice was incorrect. For socio-political¹⁷ reasons rapid rail is very likely the most generally acceptable solution. Certainly it is less disruptive socially than highways or buses on new highways. I therefore doubt that more competitive transit planning (in

which buses were owned by a stable, independent public agency) would have produced an unambiguously superior outcome.¹⁸

(2) In Minneapolis, I contend that planning competition was on the whole beneficial. Compared to D.C., rail was much riskier concerning patronage and financing, and bus a much lower sociopolitical risk than bus in D.C. Furthermore, the actors involved generally agree that had the Council avoided counterplanning,¹⁹ the outcome would have been rail. As it was, it was a near thing. Monopolistic planning in Twin Cities would have produced a needlessly expensive system.²⁰

(3) AC-BART is the most complicated case to evaluate. On the one hand, the system's mutual planning isolation combined with vague promises of future complementarity to produce operationally overlapping systems. Given BART's unexpected technical weaknesses and AC's strikes, it was fortunate that overlapping occurred. Thus paradoxically overlapping at one stage was created by its virtual absence in another.

Had the two organizations competed more persistently during planning, the most likely outcome, given that BART's coalition was more powerful,²¹ would have been BART plus AC without transbay routes.²² That would have been a problematic outcome for commuters, particularly during the first few years of dual service.²³ Of course, if BART had been better designed technically,²⁴ then operational duplication would have been less needed. Planning isolation, by avoiding choice between modes at the inexpensive stage, might have created wasteful duplication.²⁵ As it was, however, operational redundancy was largely beneficial. Therefore we cannot conclude that the lack of planning rivalry had unambiguously negative consequences.

Negative Effects of Planning Redundancy

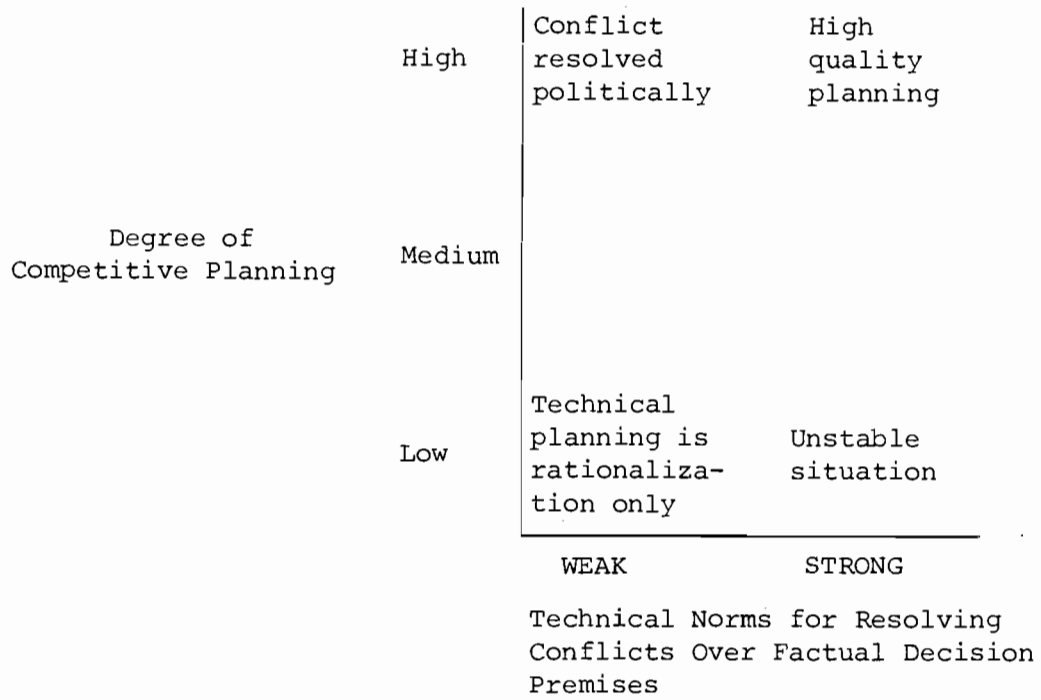
It must be acknowledged that planning rivalry in Minneapolis had some negative side-effects. Because the controversy involved fairly high stakes, and because the conflict was not an institutionalized advocacy process, the debate became personalized. This temporarily poisoned the political atmosphere. It is unlikely, for example, that the current key officials, particularly legislators, could rationally contemplate any rapid rail proposals, especially if they came from MTC.

The personalized character of the conflict in Twin Cities suggests that planning competition per se cannot ensure better decision-making. The nature of conflict resolution is also significant. The less institutionalized the decision rules for resolving disagreements over factual premises in planning, the greater the tendency to resolve issues politically, by organizational or personal influence. Increasing planning competition without also increasing the legitimacy of technically-oriented conflict resolution will merely increase politicization.

On the other hand, I hypothesize that technical decision rules tend to decay in the absence of structural (redundant) checks. That is, the degree of competition in planning interacts with the kind of decision rules for resolving conflict (see Fig. 1).

Although much competitive planning can politicize situations, impassioned, even acrimonious, exchanges are also quite frequent in noncompetitive²⁶ transportation planning, as indicated by furious fights over innercity highways. (And these have occurred in all three regions of this study.) Transit planning competition is more likely to transform conflict from an agency-versus-community mold (the highway pattern) into an interagency fight than it is to create conflict.

Figure 1



In sum, the evidence presents a mixed picture on relations between planning structures and outcomes. While intra-transit planning competition was beneficial in Minneapolis, that it was limited was not particularly important in Washington, and had it occurred in the Bay Area it may well have proved dysfunctional (if only because of a peculiar combination of circumstances).

Why do the data evince such an unclear pattern? One reason is that because in transit planning there are only a few basic options, a single set of planners can generate and evaluate them without missing any important possibilities. Transit system development is not equivalent in this regard to, e.g., weapons systems development, in which significant innovations occur rapidly.

In the medium-run fundamental alternatives²⁷ boil down to buses (with or without new highways) and rail.²⁸ There is thus a fifty-fifty chance that, in the grossest sense, the correct alternative would be chosen regardless of structure. It is therefore possible to be substantively right despite weaknesses in the planning process. And, following redundancy theory, the lower the probability of error, the fewer channels are required.

Second, the major problem in D.C. was cost overruns, which planning competition might not have improved because the uncertainty-reducing curve for cost has the wrong shape. For planning rivalry to be effective, cost estimates must improve rapidly, before heavy construction has started. But the estimates of Metro costs did not have that pattern. They were nearly linear (see appendix).

Third, political resources available to potential modal competitors in the Bay Area were somewhat unequal. Hence, planning rivalry was

guaranteed to produce a rail victory. That, given BART's flawed design, would have resulted in insufficiently redundant service. Thus the negative (counterfactual) evaluation of competitive planning in this case rests on a peculiar combination of circumstances.

To set these cases in the contemporary context of urban transit planning, we must note that all predated the national government's guidelines for transit planning. UMTA now requires capital grant applicants to submit, prior to the grant itself, an alternatives analysis which includes formulation and evaluation of plausible alternatives.

Although we have not included a study of transit planning conducted under alternatives analysis guidelines, it is instructive for us to examine alternatives analysis because it institutionalizes the textbook model of planning. This model thrusts upon a single decision-making unit responsibility for generating major alternatives, as well as for evaluating and pruning them until only one remains to be recommended. Because only one actor generates alternatives and one actor reviews them, division-of-labor rather than duplication characterizes the process.

Alternative analysis developed over several years, having been modified in public conferences in 1975 and 1976. The manifest purpose was to institutionalize more systematic consideration of transit alternatives than local planners and officials were doing. Five basic principles were enunciated by UMTA:

- (1) a mass transportation investment proposal must be consistent with an urban area's comprehensive, long-range transportation plan;

- (2) if a proposal includes a fixed guideway, then it should be developed incrementally;
- (3) improved management of existing systems should be considered as possible alternative or supplement to construction of capital facilities;
- (4) a proposal must determine which alternative is most economical and effective to achieve an area's social, environmental, and transportation goals;
- (5) there is to be "full opportunity for timely public involvement in the planning and evaluation process" (Transportation Research Record, 1977, p. 18).

UMTA maintained the above principles are needed because "the Federal government must ensure that investment decisions premised on Federal assistance are made only after full consideration of all feasible alternatives and with complete knowledge of the consequences" (ibid., p. 18); emphasis added). This rationalistic position, the formal heart of alternatives analysis, requires that search not be limited to one predetermined option. In contrast to competitive multi-organizational planning, alternatives analysis forces upon a single planning and decisionmaking unit the task of broadspectrum search, rather than upon a set of narrow-minded searchers.

The most obvious weakness in alternatives analysis is the seemingly naive requirement that "all feasible alternatives" be considered. Even rationalistic transportation planning texts warn that doing so entails a hopelessly large number of options. But UMTA's guidelines do not in fact make this obvious mistake, for they recognize that constraints of time and money preclude exhaustiveness (ibid., p. 20). Instead

a "reasonable number" of alternatives must be considered. Replacing the definite but impossible by the feasible but fuzzy could open the door to systematic abuses, such as truncated alternatives analyses. But vagueness was reduced by a qualification that alternatives must sample possible modal combinations, "so the local community can be aware of the choices available" (ibid., p. 20). In addition, the guidelines propose some nonmandatory search strategies, each informed by a different alternative-generating criterion such as investment level or service quality. Furthermore, the transportation planning community is now sufficiently aware²⁹ of a broad range of technologies that alternatives analysis's formal breadth is reasonably well-defined, even though UMTA has declined to list alternatives that must be included. Problems concerning the development of alternatives will consequently not turn on simple glaring omissions so much as on the intelligence, imagination, and thoroughness with which different options are treated, whether, e.g., alternative X's best features are fully exploited, but not Y's. A key question then becomes, how easily can a central reviewing staff discern whether the design of alternatives was even-handed, and the evaluations fair?

This is a difficult task, and it is not surprising that GAO's review of the process noted several problems. These included poor communication between Washington and local project sponsors, and delayed UMTA identification of problems in submitted alternatives analyses (GAO, 1979, pp. 12, 22-23). UMTA has taken steps to correct these difficulties (including monitoring analyses while in progress (UMTA, 1979)). Yet it is hard to see how UMTA's small staff can avoid falling between the horns of a dilemma. Either it will not impose long delays, and will tend to rubberstamp applications (or reject them on nontechnical grounds), or it will review and scrutinize more carefully but will consequently impose

delays.

In its reply to GAO's report, UMTA acknowledged the difficulties of reviewing proposals at the end of a long sequential planning process: "problems . . . [such as] overoptimistic ridership and revenue forecasts, underestimated costs, . . . are difficult, if not impossible, to ferret out before the analysis is completed" (ibid., p. 4). Indeed, the reply indicated that UMTA recognized it was not receiving unbiased alternatives analyses, but that project sponsors adopt an "advocacy role" (ibid., p. 4), which causes the above problems. This tacitly recognizes that issuing analysis guidelines cannot guarantee that project sponsors will not play games with numbers.

Nevertheless, despite recognizing advocacy in alternatives analysis and grant applications, organizationally UMTA has put its faith in a single sponsor to design, evaluate, and recommend options. Though neither alternatives analysis nor the capital grants guidelines refer to redundancy in planning, an UMTA document entitled "Urban Mass Transit Act of 1964 and Related Laws" contains OMB Circular No. A-95 which bans competitive planning. "The purposes of this Part (IV) are: . . . to eliminate overlap, duplication and competition in areawide planning activities assisted or required under Federal programs" (p. 72). Thus alternatives analysis is recognized and sanctioned by UMTA as one-sided advocacy; there is no competing planner to provide countervailing power.

The above is not quite correct. For budgetary reasons UMTA itself has been driven to become a counter advocate.³⁰ Because there are more proposals than funds, UMTA must pressure project sponsors to apply for cheaper options. Not surprisingly local officials reacted strongly to early UMTA alternatives analysis publications. They argued that UMTA's emphasis on Transportation System Management in particular and low capital

options in general indicated that alternatives analysis was an important part of "a major thrust of UMTA . . . to allow capital development to be constrained by the budgetary process and particularly by the alternatives analysis requirement" (Transportation Research Record, p. 3).

Local officials, sensitive to substantive implications of any procedural change, quickly assumed that alternatives analysis was only a device to rig the process in favor of cheap solutions. Given budgetary realities, this rigging is probably inevitable. UMTA would like to place the "burden of persuasion" on rail so that only those regions that need it badly would receive aid.³¹ Thus the probable bias of applicants for heavy rail solutions--a bias stimulated, ironically, by the greater availability of Federal aid for capital than for operating expenses--will be met by UMTA's bias for low capital solutions.

The hard facts of budgetary scarcity, combined with the increase in the seventies of applicants for Federal assistance, will probably constrain and shape transit system development far more than will the forthcoming criteria to guide the alternatives analysis process. Since aid money will continue to be scarce, UMTA will be able to turn down new rail projects on the coarse but effective basis of cost alone, regardless of the adequacy of submitted alternatives analyses, and will be able to induce applicants to scrutinize lower cost options more intensively.³² In such conditions a rejection has to be based only minimally on technical review and based far more on the national government's unwillingness to approve many expensive grant applications. If, on the other hand, UMTA's budget has some slack, it would be difficult to deny requests even if they do not follow the guidelines.

Since planning competition is not likely to become institutionalized in urban transit planning in the United States, safeguards against one-sided

advocacy will have to rest on a combination of limited federal grants and procedural requirements such as alternatives analysis. Fortunately, alternatives analysis will not have to stand alone. Budgetary exigencies have driven UMTA to become something of a counter-advocate for cheap solutions, which suggests that some form of multiple, independent advocacy of alternatives is a functional requisite of effective planning.

B. Operational Duplication versus Monopoly

To recapitulate briefly, there are two types of redundancy to consider here: (1) passive, or non-interacting, and (2) competitive. The former refers to transit agencies merely paralleling each other's operation. The latter connotes parallel organizations fighting over scarce resources (patrons, taxes). The respective hypothesized advantages are increased transit system reliability, due to the sheer availability of independent alternatives, in the case of passive redundancies, and more adaptive, flexible behavior and better service provided by rival transit operators in the case of competitive redundancies. How well do the cases fit the hypotheses?

Passive transit redundancies protect against (a) developmental uncertainties, including short-term system debugging, and relatively permanent features such as service strategy; and against (b) episodic shocks such as strikes. Concerning development, BART and Metro contrast sharply. BART, plagued by risky design and the lack of preoperational testing, has struggled to achieve reliable service. In contrast, Metro, with more conservative technical design, reached within four or five months a level of reliability that has taken BART years to attain. Had

Metro combined its command style of turning back buses with BART's prolonged unreliability, patrons undoubtedly would have reacted far more negatively. But whereas BART badly needed AC as a safety valve,³³ Metro-rail did not need Metrobus in the same way.

Concerning service strategies embodied in different modes, the AC-BART combination offers variety, whereas in Washington riders are constrained. And for reducing demand uncertainty a redundant operation is preferable to a monopolistic one (Chapter Three, p. 93). But whether bus and rail offer very different bundles of service attributes is open to question. In Bay Area surveys they scored quite close to each other; the difference between transit and autos was much larger than intra-transit differences. And while in Washington commuters initially reacted negatively to being limited to one mode, that was partly a reaction to an easily corrected problem (increased fares). Thus differences between modes may be either extrinsic (e.g., fares) or intrinsic but so small that most commuters are indifferent to them.

The significance of episodic uncertainties is more difficult to assess because it is difficult predicting how frequent and how severe such occurrences will be. Redundancy appropriate for worst case scenarios would seem excessive when random shocks do not materialize.³⁴ It has turned out that the Bay Area has had from 1973 to 1978 more than its share: two severe strikes by AC's union;³⁵ over a dozen single-day (or less) interruptions of BART service, activating AC's "bus bridge"; and most recently the fire in BART's tube leading to a PUC-ordered closure of the tube for over ten weeks. We can say, with hindsight, that organizational redundancy has served transit riders well against these disturbances.³⁶ It is worth noting that no major actor predicted the degree of disruption that the two systems experienced, and that the protection

afforded by redundancy was quite unplanned. The undesigned is rarely so benign.

Washington has endured not only fewer developmental shocks but fewer episodic disturbances as well. There have been no major strikes.³⁷ That is fortunate for patrons, since the union has, with Metro management blessing, unified the locals (unlike AC's and BART's locals which remain independent). Of course when a strike does occur, we can confidently predict that it will be more disruptive than those in the Bay Area because of the combined effect of nonredundant service and unified union.³⁸

When I looked for effects of competitive transit operation, the results were not what I had expected. Regarding rail, though there were numerous differences between Metrorail and BART (particularly in technical design), these were not due to a difference between competitive and non-competitive operations. Indeed, BART's operations do not appear to have been much affected by competition. As for buses, while AC's service has been superior to Metrobus, it is unlikely that most of this difference can be attributed to the difference between competition and monopoly. AC's service record predated BART, and its service and fare behavior seems little affected by BART.³⁹ Indeed, AC has a reputation as a quite conservative organization, and has responded slowly to communities' requests for different kinds of service, before and after BART started operations.

Metrobus, on the other hand, has been impaired by WMATA's integrated structure, particularly in the early post-merger period. Whereas AC's conservatism preserved an effective system, the Washington bus systems badly needed improvements. In that context conservatism implied continued stagnation.⁴⁰ Although Metro had at least one bus manager who wanted to get things moving, it proved difficult to obtain decisions

from Metro's centralized bureaucracy. The lack of competition was less detrimental than the tightly integrated organizational structure which inhibited bus managers' initiative. It is informative to compare Metrobus with AC's start in 1958-62, when a small cadre of top managers, unimpeded by another mode's personnel, revitalized the ailing Key system. It is interesting to speculate what would have happened had Washington's bus systems remained independent of Metro, without necessarily competing. The difference between the achievements of AC and Metrobus depended more on management independence than on organizational rivalry.

If tightly integrated transit organizations impair managerial capacity to effect change, what about external channels of access and communication? Do modally specialized agencies provide more channels⁴¹ for access and complaints by clientele than does a single integrated organization?

In Washington, the situation is rather mixed. There have been complaints, in D.C.'s black press, that Metro was not attentive to the interests of inner-city (black) residents. However, Metro's federated board is a channel for geographically based discontent to reach the organization. There is considerable subregional consciousness (some call it parochialism) on the board, which partly compensates for the lack of a transit agency oriented to intra-city patrons.

I do not think AC has been behaviorally more responsive to poor people than has Metro. That is, although poor people have been served better by the Bay Area's multi-organizational system than by D.C.'s single agency, that was a product of AC's historical route structure, traditionally strong in the Berkeley-Oakland urban core, not because of easier clientele access to AC's decision centers.⁴² AC did not have to

respond positively to the demands of captive urban riders; it merely had to resist changing in directions BART wanted it to go. The multi-organizational system was not behaviorally more responsive to clientele, but it provided a richer set of options and more resistance to reducing that set.⁴³

Coordination Tasks
and the Advantages of Integration

Of the problems integration is supposed to ameliorate, intermodal difficulties are most palpable. Coordination here refers not to some vague philosopher's stone of administration, but to practical matters such as making a patron's intermodal transfer convenient and swift. How does Metro's integrated structure compare in its handling of these tasks with the interorganizational structure of AC and BART?⁴⁴

In the main, Metro has coordinated more effectively. Consider the following. (1) AC and BART took a long time to agree upon even a one-way transfer, and even that required outside help. Metro staff have developed a flashpass usable in either direction.⁴⁵ (2) Metro has tried harder to smooth out logistical problems of transfer, such as buses departing just as a train arrives. These problems tend to fall into interorganizational cracks between AC and BART. In general, I believe that on no technical coordination task has the interorganizational structure worked better.⁴⁶

However, some coordination tasks which Metro has completed more quickly, such as rerouting, are more complicated to evaluate because of distributional implications. Metro's cuts of parallel routes benefit nonriding taxpayers more than commuters; the AC-BART situation is just

the opposite in that duplicate service benefits riders, not taxpayers. Similarly, Metro's extensive rerouting of bus lines to improve access to rail is a boon for rail riders; it inconvenienced bus-only patrons. Again, the AC-BART situation reverses the distribution of advantages and disadvantages. Since BART has not persuaded AC to do more than bend its bus routes to train stations, bus patrons are protected from inconvenience, but access to BART is poorer than to Metrorail. There is no simple way of evaluating outcomes with these distributional effects. It cannot be said, however, that efficiency in any simple sense has been increased by establishing monopolistic transit service.

Coordination and Antagonistic Cooperation

Popular notions of public organizational competition reflect a pervasive belief that conflict between agencies presumably pursuing the public weal is undesirable. Integration, then, is a method to eliminate not only duplication but antagonisms as well. And reducing antagonism should in turn improve coordination.

But we cannot, in these two cases, attribute Metro's better technical coordination to less intermodal antagonism--because I doubt that the cases differed significantly here.⁴⁷ Bad feelings certainly exist in Metro, particularly among operators, but because of hierarchical constraints they do not appear to have much effect. The AC-BART situation is, curiously enough, quite similar. Constraints, such as fear of outside intervention, reduce the effect rather than the existence of antagonisms.

Metro's integrated structure minimizes the effects of antagonism in a second way. Some problem-solving, such as figuring out transfer arrangements, are simply removed from an intermodal arena. Personnel

working on them do not represent modes. Problems are settled and solutions become given decision premises for modal managers. In contrast, in the AC-BART chapter I raised the possibility of a "spillover of antagonism" from competition to complementary tasks, noting that the two domains were poorly insulated from each other at planning and policy levels.

C. Redundancy in Different Contexts⁴⁸

Possibly the most important question on applying redundancy to public organizations is not whether but when redundancy can be efficacious. A priori, it is unlikely that redundancy is valuable either nowhere or everywhere; the trick is specifying appropriate types of situations. The author believes that the distinction between planning and operations will prove significant.

This section's questions are partly organizational: do these two kinds of redundancies differ in their pattern of origination and in their stability? The other questions are policy-oriented. Which type of duplication, planning competition, or operation redundancy, gives decision-makers more information on the effectiveness of transit alternatives? Here we will examine the evaluative function performed by redundancy at different times in decisionmaking.

The Emergence of Redundancy: Comparisons

Chapter One suggested that the appearance of redundancy in the public sector has three characteristics: (1) redundancy is triggered either by an executive seeking flexibility, or as a by-product of inter-agency politics; (2) if it were the latter, then one agency's encroachment on another's jurisdiction tends to be gradual; (3) redun-

dant agencies tend to be established at different times for apparently different purposes. Do the cases support these hypotheses?

(1) The redundancies investigated here were not the intended result of a central authority seeking either decisional flexibility or communications checks. Rather, both pairs of agencies were established to work on distinct problems: sewers and transit in the Twin Cities and regional versus subregional transit in the Bay Area. In both cases overlap remained latent for a while--five years in Minnesota (1967-72) and, following a brief early conflict, approximately seven years in California (1958-65).⁴⁹ During these periods it appeared that conventional differentiated relations would take hold. Activation of latent redundancies occurred in each case because organizational integrity was threatened. In the Bay Area, operational redundancy became a real possibility when it was becoming clear that AC would be financially hurt by withdrawing transbay routes (and that there would be no compensation). In Minneapolis, the Council feared its authority was being eroded by single-function agencies. In each case, the threat to organizational integrity could be met by creating or maintaining redundancy.

(2) In neither case was jurisdictional encroachment gradual. In Minneapolis the Council entered transit planning quite rapidly, following top personnel turnover. Gradual encroachment was hypothesized in Chapter One partly because hierarchically equal agencies were assumed. But the Council's hierarchical status gave it leverage to move less cautiously. In the Bay Area, encroachment cannot describe the process. The charter legislations of both organizations created an overlap potential, activated by AC's growing determination to refuse to withdraw. BART, of course, was not incrementally encroaching on a turf; it was building a system within bounds set in the early sixties. Gradualism as

a strategy was simply irrelevant.

(3) The hypothesis that governmental redundancy results from converging overlapping agencies originally established for different tasks was supported. But I also conjectured that duplicating agencies would not have been simultaneously installed because temporal separation decreases the predictability of a competition generally regarded as illegitimate. This proposition was not supported. Both pairs of agencies were founded very close together in time. I overlooked in Chapter One the following counterargument.⁵⁰ If potentially redundant organizations are founded simultaneously, then none will be strong enough to bar rivals from the policy field, whereas if their births are widely separated the older agency can mobilize opposition to a new competitor. In both cases the agencies had their hands full getting started, and, aside from a brief AC-BART conflict,⁵¹ avoided expending energy blocking each other.

When studying the appearance of redundancy, one should consider not only whether it occurs, but also at what point in decisionmaking. Why did competition emerge in Minnesota in planning, but was averted in the Bay Area until later?

If one had examined the Bay Area in 1957 and the Twin Cities in 1967, probably one would not have predicted that planning rivalry would develop in the latter and not in the former. Indeed, the converse appeared more likely, given the closer functional relation of BART and AC. How to explain what happened? I think the main explanatory burden rests on the different laws. The Minnesotan agencies were by law thrown against each other far more than were AC and BART. While both the Californian and Minnesota laws were ambiguous about boundaries, the former formally separated AC and BART whereas the latter formally made the Council and MTC interdependent during planning. (Though the Minnesotan law prescribed

a differentiated generate-and-review process, not redundant planning.) While it was legally feasible, and politically advantageous, for AC and BART to avoid each other from 1958 to the middle sixties, that was not possible for MTC and the Council. Because the Council was fiscally responsible for the region,⁵² MTC was obligated to come to it for project review and approval. This requirement set the stage for the Council's counterplanning.

Though designed redundancies are readily used, there being no confusion as to their existence or potential, undesigned duplications, which may surprise the unprepared, may be less usable. As argued above, the redundancies in this study emerged as largely unintended consequences of organizational maneuvering. Nevertheless, both were exploited by third parties, decisionmakers in Minnesota and patrons in California. Assuming that many governmental redundancies will be unintentional, it is pertinent to inquire how they will be used by third parties, and whether planning and operational redundancies differ in this regard.

Based on these two cases, the probability of using competitive planning and service redundancies differs sharply. Commuters regard bus and rail as pragmatic alternatives,⁵³ to be differentially exploited as circumstances (price, convenience, reliability) dictate. Alternative modes are palpable and difficult to ignore. It was easier for legislators to ignore competing plans in Minnesota. The potential of an option still in the blueprint stage is more obscure than the advantages of alternative services. In addition, legislators were initially unprepared to take advantage of redundancy. In contrast, switching from one transit mode to another is a routine matter.

The Stability of Redundancy

We noted in Chapter Four that the Minnesota Legislature terminated planning competition in 1975 by redrawing jurisdictions, making new appointments, and banning further rail studies. The heyday of overt overlap between the two regional agencies lasted only two-plus years. In contrast, BART and AC's service parallelisms have lasted from 1974 to the present and show no sign of disappearing imminently. Why was one redundancy more stable than the other? Two factors must be taken into account.

First, the Twin Cities conflict was much more visible to the state Legislature, which had the authority to eliminate competition, than was the AC-BART situation. Because the Minnesota Legislature was directly responsible for the existence of the Council and MTC (unlike the California Legislature which was only partly responsible for BART and AC), and because Twin Cities is an extremely important part of the state,⁵⁴ the Legislature had actively monitored the substance and structure of metropolitan government through its metropolitan affairs committees. Between 1967 and 1975, significant urban governance bills were proposed in every legislative session. Furthermore, the 1967 legislation stipulated that if the Council and MTC disagreed, the Legislature would hear the issue. Thus there was a formalized procedure for bringing substantive conflicts--and, as it turned out, organizational ones as well--to the Legislature's attention. In California, legislative contact with AC or BART was relatively meager in the sixties. There was no tradition of state involvement which could be tapped when conflicts arose. Finally, the Minnesotan decision, involving hundreds of millions of dollars and

the regional transit system's fundamental features, was a far more important issue than AC-BART service overlaps. In sum, it was overdetermined that Minnesota's Legislature would pay more attention to their case of redundancy than would California's.

While the AC-BART case did come to the attention of local politicians--a few mayors--these lacked authority to intervene. The structural analogue to the Minnesota Legislature for resolving interagency disputes was the Metropolitan Transportation Commission. Although the dispute was quite visible to the Commission, MTC lacked the unquestioned authority that the Minnesota chambers possessed.

These points explain the differential visibility of the two redundancies, but not why the Minnesota Legislature finally chose to eliminate overlapping.⁵⁵ There were two major reasons. Because the redundancy was highly competitive--the agencies had much to lose--the situation was politically heated. The Bay Area case was tepid by comparison.⁵⁶ The rancor eventually upset important state senators specializing on the issue, and they became eager to end the affair. Their nonspecialized colleagues had been bothered for some time by the bewildering array of options and technical complexities, and were more than happy to help end it.⁵⁷

Instability was built into the redundancy in Minneapolis. Because it was only a planning overlap, all those involved expected that eventually a decision would have to be made between alternatives, ending the matter. And, unlike weapons competition, in which a service intends to propose, plan, and operate a system, the Metro Council was only a planner.⁵⁸ Because it was not going to operate an option there was no danger that there would be an armed services-type push for realizing all alternatives.

Compounding the inherent instability of planning competition were the ambiguous authority relations of the Minnesota agencies. In California BART could not order AC to differentiate itself, and reorienting either their jurisdictions or authority relation would change a clearly defined status quo. But most Minnesotans had assumed since 1967 that the Council and MTC were to work on different problems. Thus the legislature's rearranging metropolitan government boundaries in 1975 could be seen not as departing from the status quo but as effecting old intentions.⁵⁹

Although it was improbable that the Bay Area overlap would have been eliminated by an external authority, redundancy can also be destabilized by interagency negotiations or by one agency persuading another to leave the field. But neither of these decision processes proved viable for AC-BART. BART became financially strapped as development proceeded, so compensating AC for losing transbay routes was not broached. And persuasion was a weak method for BART to have relied upon, given the obvious importance of transbay lines to AC and given the lack of evidence that BART could do a better job.

Competitive Planning and Operational Redundancy as Evaluation Processes

Planning and operational redundancy can function as evaluation procedures, the first ex ante and the second ex post. Each has characteristic strengths and distortions. In operational transit redundancy, evaluation is implied by patrons' behavior. It is decentralized, many small evaluations replacing the few big evaluations of competitive planning. Unlike ex ante evaluation of alternatives, it does not have to weight transit criteria--patrons do that--or estimate demand functions. The revealed preferences of riders are less subject to deception, by itself and others, than are planning predictions. Furthermore, although

political resources can always play a part, they can distort evaluations more during planning than operations because operations produce more evidence on modes' merits, counterbalancing inequality of political resources.⁶⁰ Thus evaluation derived from operational redundancy is less sensitive (though not insensitive) to unequally distributed resources of bureaucracies or other agents.⁶¹

But the evaluative function of operational duplication has its distortions. (1) Riders do not consider side effects of modes, such as effects on air pollution or development clustering. These by-products must be considered by a governmental body. (2) In general, operational competition is a more expensive evaluation. In comparison with the heavily subsidized transit operations, all planning studies in the Twin Cities cost only about \$5,000,000, may have saved the region many times that amount, and were a one-shot rather than an annual expense.

Finally, because these are ex ante and ex post strategies, they trade off information for reversibility. Competitive planning is necessarily a more risky evaluation: one does not know for certain how much patronage a rejected alternative, such as MTC's rapid rail, would have garnered. But at least momentum had not predetermined evaluation or choice. The Minnesota legislature had a genuine decision to make in 1973-75, because both bus and rail were technically and politically feasible. In operational redundancy, though the modes' merits are more evident (an ex ante evaluation of BART and AC in 1960 would have overestimated the former's reliability and underestimated the latter's strike vulnerability), sunk costs make it difficult to use the available information.

This conclusion, however, oversimplifies by ignoring the difference between AC's and BART's sunk costs. If a longrun operational

evaluation indicated that, due possibly to worsening traffic congestion and improving BART reliability, AC's transbay routes were becoming less cost-effective, they might be eliminated. But the contrary would not obtain. Transportation economists can argue ad infinitum that sunk costs are sunk, and that rationality requires considering only future costs and benefits. It is nevertheless hard to imagine that the Bay Area would abandon a still-new facility.

Summary

(1) Competitive versus Monopolistic Planning. In terms of the process of planning (breadth and depth of search for alternatives, and systemic capacity to accommodate change in a task environment), the most competitive structure was the most impressive. But regarding outcomes, though transit planning rivalry produced a satisfactory conclusion in Minnesota, it is by no means evident that its absence was injurious in the other two cases--for quite different reasons.

(2) Redundant versus Monopolistic Operations. As both BART and AC experienced more operational problems than had been anticipated, redundancy was by and large beneficial. There is no strong evidence that overlap's cost (monetary or the opportunity cost of service misallocation) was exorbitant, or that by-products such as organizational antagonisms crippled coordinating complementary actions. The effect of competitive redundancy was, however, minimal. In comparison, Metro has thus far needed operational redundancy less than did the Bay Area systems. Metro's dysfunctions were due more to integrated management than to monopoly service.

(3) The Timing of Redundancy. The major conclusion here concerns

the relation between information and reversibility. Competitive planning gives decision makers more flexibility at the cost of higher uncertainty; redundant operation provides more information about options' cost-effectiveness but gives less room to do anything about it. This trade-off obviously worsens the more alternatives involve sunk costs. In different policy areas the relation is less severe (see Chapter Seven).

More theoretically, these cases can give us insight into the general problem that opened this study, the relation between organizational levels and their corresponding levels of reliability. In the first few pages I asserted that organization theorists had missed an opportunity in not exploring the variable constraints that operate at different organizational levels. Instead we have seen an unfortunate tendency to psychologize organizations, to assume by analogy that organizations have the same properties of routinization, of limited search capacity and alternative generation that describes individual decision-makers.⁶²

The approach of this study has been quite different. It has assumed that capabilities at one governmental level need not correspond in a simple way to those at another level. What do our cases tell us about this question?

(1) The Minnesota case indicates that a multiorganizational system can produce an outcome which is unplanned by any organization, yet which may well be superior to any of the alternatives designed by any of the actors.

(2) AC-BART system is operationally more reliable than either of its subsystems, again despite the fact that the institutional structure is but the unintended product of organizational maneuvering.

None of the above actors displayed unusual planning or decisional

capacities; all exhibited reasonably stable mindsets and action routines. Yet these "limitations on human (read "organizational") computation and choice" (in Simon's words) were not translated simply into limitations of the larger system. There were instead degrees of interorganizational compensation.

These conclusions are at a middling level of abstraction. In the next, and last, chapter we examine more generally redundancy's desirability and feasibility in government.

Footnotes

¹This is an exaggeration. It is possible that a sound transit system could come into being without adequate search for alternatives--AC being the obvious example. But in such cases it is the management of the single alternative which counts, not planning.

²We must keep in mind that in the fifties there was no formalized planning process which mandated a broad alternatives' search; that neither agency conducted one was not considered unusual at the time.

³This sequential process came to strongly resemble Lindblom's model of disjointed partisan mutual adjustment, a decision process which will be examined in Chapter Seven as an alternative to planning competition.

The Washington case is a clear example of how disjointed partisan mutual adjustment can mimic or simulate a comprehensive decisionmaker who has responsibility for the entire set of options in an issue area. Although early on NCTA regarded itself as the comprehensive transportation planner, capable of making or vetoing decisions between mutually exclusive modal investments, this stance produced too much political controversy to be a stable position, and disjointed mutual adjustment became the pattern. By late 1964 NCTA had retreated to advocating rail only; it no longer opposed highway construction. In the interim, however, neighborhood groups in D.C. which opposed the building of freeways through their backyards had become better organized, and in a thoroughly disjointed fashion, the process proceeded as if transit and highways were mutually exclusive alternatives, although by this time the choice process had become quite specialized--the advocates of one mode (rail) had little or nothing to do

with what had been their natural allies (the anti-freeway groups), and vice versa. The collective result of these specialized endeavors, a rapid rail system and a greatly diminished highway network in Washington, was very close to what NCTA had been trying to accomplish as a comprehensive planner.

⁴The Post's editorial comment in 1962 was "in seven long months there have been no new engineering data, no new ideas, no new proposals. The format is now standardized" (6/11/62).

⁵Though highways were eventually defeated.

⁶As well as at the expense of the neighborhoods through whose territory the intrusive projects would go.

⁷We note here the difference between the logrolling-bargaining common in pluralist systems where public planning is either monopolistic or weakly competitive, and a polycentric system in which there is stable competitive supply (see Chapter One, footnote 6). This interagency negotiation is a subset of partisan mutual adjustment (see Chapter Seven), but its effects are not invariably benign.

⁸The Office of Technology Assessment, which studied transit planning in nine metropolitan areas, concluded that the Twin Cities' was superior (1976).

⁹The low-capital transit alternative, such as the Citizens' League idea of viewing any rider as being in the transit mode, was an increase in breadth of search. It had not been considered in early MTC planning.

¹⁰Perhaps the most important consequence of detailed search of multiple alternatives was that the ultimate decision-makers, the legislators, were not forced into feeling that if they rejected rapid rail they would be rejecting transit altogether. There were credible alternatives they could back.

¹¹Some formulations in decision theory under uncertainty incorporate subjective probability estimates of the value of information derived from further search. Obviously this is not much of a solution for collective decision-making.

¹²It would be interesting to examine how the legitimacy of the planning process varied with the breadth and depth of the search process, i.e., would a more exhaustive search be perceived as more legitimate? Unfortunately, I do not have the data required to answer this question.

¹³Precisely this belief was expressed to me by opponents of MTC in the Twin Cities. I think it is a commonly held view of those who fear rule by technocrats that formal prescriptions of broad search and redesign (iteration) are not genuinely adhered to.

¹⁴Probably the most important "adaption" occurred during construction, when it was decided to eliminate preoperational testing. This was a response to community pressure for less delay in opening.

¹⁵It was not then realized that for certain highways buses' traffic environment could be controlled by the much cheaper method of ramp metering, which one planner termed "a poor man's busway."

¹⁶These, rather than changing community preferences, were the content of organizational learning.

¹⁷Not in terms of transit-as-movement criteria.

¹⁸Possibly a more modally mixed system, akin to the 1965 plan where the rail lines ended after reaching past congestion bottlenecks, would have been cheaper and approximately equivalent in terms of movement and social disruption criteria as the existing system. More extended planning competition might have produced this outcome. However, negotiating an interjurisdictional financing formula would have been difficult.

¹⁹That the PRT group caught the attention of the Senate subcommittee was also important.

²⁰While bus operating expenses soared to unexpectedly high levels in 1976, that was partly reversible. The bus system contracted in the following years.

²¹We note here the importance of parity in resources for planning competition. The process will not necessarily be an improvement over monopolistic planning if rivals' resources are significantly unequal because then a decision "on the merits" will be difficult to achieve.

²²Because the two had few overlaps in the East Bay and because the East Bay badly needed local transit service, it is highly unlikely that even a prolonged planning fight would have finished AC completely.

²³The only settlement that would achieve service differentiation without threatening the existence of either agency would have been to have given the transbay to BART.

²⁴Technical design is unaffected by the degree of external (intermodal) planning competition, which suggests that the region would have benefitted more from intra-organizational checks on technical design than from intermodal competitive planning. But that is another story.

²⁵Although this would probably have been correctable, since there would have been great pressure on AC to remove parallel routes had BART been a "turnkey" system.

²⁶Of course the urban highway fights throughout the United States were intensely political, but they were noncompetitive in that a single mode was being advocated and opposed, rather than a multiplicity of solutions as in the Twin Cities.

²⁷Personal Rapid Transit, which would be a major service gain

over today's systems, is well off in the future.

²⁸Although transportation planners refer to a "virtually infinite range of alternative designs" (Morlock, 1978), that includes many variations on a few common themes.

²⁹This was not the case in the fifties and early sixties (Office of Technology Assessment, 1976, p. 32); one could not assume then that a transit planner would be conversant with a broad spectrum of alternatives.

³⁰Because UMTA has neither the authority nor the resources to plan, nor the ability to mobilize local support, its counter-advocacy of cheaper projects will not blossom into full-fledged competitive planning.

³¹See UMTA's "Policy Toward Rail Transit": "...there is a fairly well-defined limit to the number of rail projects that could be justified as meritorious and deserving of Federal support in the foreseeable future.

Urban Areas will have to demonstrate a compelling need for high-capacity, high-performance transit service in order to obtain Federal assistance for rail rapid transit." (Federal Register 43, No. 45, March 1978, pp. 9428-9429; original emphasis).

³²Furthermore, UMTA staffers have greater incentive to scrutinize applications carefully if their budget is tight.

³³Recall that by 1974 BART was opposing Greyhound's withdrawal from transbay service, and in general was concerned about having insufficient peak hour capacity.

³⁴I suspect that part of the argument over redundancy turns on different actors' subjective probability estimates of worst-case scenarios.

³⁵The first one occurred when BART, not yet in transbay service, could only cover for some of AC's eastbay express runs.

³⁶Although it is possible that for BART's shortterm breakdowns, a latent reserve of buses, possibly owned by BART and operated by AC, would have sufficed.

³⁷The 1978 Metro strike was unauthorized. The effects of one legitimized by the union are still unknown.

³⁸On the other side of the ledger, transit strikes in D.C. will be less frequent than in the SFBA because Metro has fewer unions. And if, as appears likely, transit union locals monitor each other's contracts and strive to match or outdo one another, then D.C. will endure slower wage inflation. The tradeoff is between the frequency and intensity of strike effects.

³⁹It is more difficult to discern whether BART service or fares have been affected by AC's presence than vice versa because AC's operation predated BART's. We have a "before" record of AC but not of BART.

⁴⁰And Metro has been as slow as AC in providing new types of bus service to communities. In several cases, such as Montgomery County "Ride-On," the communities have decided to go it alone.

⁴¹The classic Public Administration doctrine that there should be clear lines of responsibility is often cited in this context as a rationale for eliminating duplication (Chapter One, p 14). The notion is that parallel channels, far from making it easier for citizens to register complaints, make it more difficult for people to decipher which bureau is responsible for unsatisfactory service. Duplication breeds confusion, rendering access pointless.

Actually, however, there was little difference between the redundant and monopolistic situations on this dimension. In the AC-BART case, there was some confusion regarding who was responsible for the

mediocre complementary service integration. But difficulties in parallel lines caused no confusion at all. AC was as clearly responsible for its strike problems as BART was for its technological difficulties. The conclusion is that redundancy per se does not inevitably confuse lines of responsibility, particularly if the parallel channels are independent.

Furthermore, although Metro patrons know whom to blame when things went wrong, monopoly created a dependency relation, so that though citizens know what agency to blame, inducing it to do something is another matter entirely. The doctrine of clear lines of responsibility must have buried in it an assumption that bringing about agency complicity was not a significant obstacle, and that the major problem was knowing whom to fault.

⁴²From the newspaper record, there was little evidence of interest group mobilization directed toward AC. Even when it did happen, the congruence of interest between riders and agency makes the analysis of influence problematic. Thus when AC announced it was going to cancel, upon BART's opening, an east bay express line, riders presented a petition and the route was not cancelled. But is impossible to discern how much influence the petition had, and how much the management and board wanted to move in that direction anyway.

⁴³Riders are, however, only a portion of a public organization's constituency. There are also nonriding taxpayers. Here WMATA's structure proves more responsive. Metrobus's differentiated fares reflects the fiscal preferences and revenue-raising capacities of the politics comprising the Authority. In contrast, AC, a low visibility special district, raised its property tax steadily for more than a decade without effective constraint. But this difference in fiscal accountability resulted from

differences in political procedures governing the boards, not from the difference in modal organization, and is therefore not germane to this study.

⁴⁴This comparison is facilitated by the technological similarities of the two problems (the modes, the automatic fare equipment). We can attribute the differences in outcome largely to the differences in organizational structure.

⁴⁵The advantages of integration which facilitates devices such as the flashpass are, however, somewhat offset by the confusions induced by integrated multimodal accounting. It is more difficult for outsiders to comprehend the financial status of the modes in Washington than in the Bay Area.

⁴⁶One argument for intra-transit coordination is that bus and rail must mesh smoothly so a linked transit ride competes favorably with the auto. In D.C. in particular it was expected that the bus would provide a heavy proportion of the access to rail. People, however, have their own ideas about multimodal trips. In both operational cases the proportion of people riding bus to rail is less than, and the proportion accessing rail by car higher than, expected. Apparently there is a strong preference to have one leg of a trip be demand-responsive and dependable. Consequently the trip that often competes with the all-auto ride is not a pure public transit trip, but a mixed private-public one, in which coordination is decentralized.

⁴⁷In fact one could make a good case for arguing that integration increased antagonisms among operators because it increased the relative deprivation of bus drivers.

⁴⁸In this section I will focus exclusively on the emergence of

planning competition in Minnesota and operational duplication in the Bay Area.

⁴⁹Periodization is more difficult in the AC-BART case.

⁵⁰In Chapter One I was concentrating on an anti-redundancy attitude among elected officials who were responsible for the creation of agencies. Hence I hypothesized that a temporal separation would increase the probability of redundancy being overlooked.

⁵¹This clash's end corroborates the point. The conflict was settled partly because neither organization felt it could afford to fight.

⁵²Neither AC nor BART had financial responsibilities for any other agency and could, at least during system planning, virtually ignore each other.

⁵³I believe the pragmatic behavior of users is independent of the symbolic-verbal level wherein they might condemn redundancy in the public sector.

⁵⁴While the Bay Area's population is roughly twenty percent of California's, the Twin Cities' is about fifty percent.

⁵⁵Although I did not discuss details of the highway-rapid rail fight in the Washington case, it is interesting to compare it with the Minneapolis case concerning the reaction of decisionmakers to undesigned planning competition. The reaction in Washington was almost uniformly negative. The Post's editorial reactions must be taken cautiously because it was supporting both freeway and rail construction (and was therefore flatly opposed to the agency conflict which delayed both). But the Congressmen before whom the debate was conducted were also antipathetic. In 1962 the House Appropriations Committee scolded the partisans: "The rivalry is sowing confusion and disorder" (Washington Post, 6/23/62). In 1963 Representative Whitener, chairman of the hearings on

NCTA's 1962 plan, said he hoped that the hearings would not degenerate into "a battle between advocates of one system over another" (Star, 7/10/63), and Representative Broyhill noted that "This committee is reluctant to sit in judgement over these difficulties between experts" (ibid.).

Two themes ran through these objections. One, expressed most frequently by the Post, was that the transit-highway conflict would endanger both projects--a realistic fear, as it turned out. The second was an unwillingness to step into complexities where even experts disagree. The second theme was also encountered in Minneapolis. Nonspecialist legislators grew quickly tired of mulling over a problem in which experts disagreed. However, unlike Washington, there was a core of legislators who did make use of agency competition.

⁵⁶The difference in the heat of the controversies was clearly not due to the personalities of the main actors--Bingham and Stokes were as feisty as the principals in Minneapolis--but was due to the difference in the stakes.

⁵⁷This problem of generalists arbitrating between competing specialists is of course not restricted to this policy area. Henry Levin, in describing the difficulties of using an advocacy-type process in educational policymaking, quotes Justice Powell: "in view of the division of opinion among scholars and educational experts...the judiciary should refrain from deciding the issue" (1975, p. 239, footnote 71).

This difficulty also cropped up in my fourth (unreported) case study of informal redundancies in BART development efforts. In at least two incidents, parallel problem-solving led to decisional paralysis because an arbitrator was unable to choose between competing solutions.

I believe, however, that if this difficulty became a persistent problem at a particular organizational level, expertise in the form of

additional staff would gradually accumulate at that level. It is not an insoluble problem.

⁵⁸And of course Anderson's PRT group was only active in planning.

⁵⁹This certainly was how the Council supporters viewed the arrangement: the Council would finally occupy its intended role. In fact, as I argued in Chapter Four, the Council-MTC relations were objectively hazy; it was not clear what the legislature's intentions in 1967 had been.

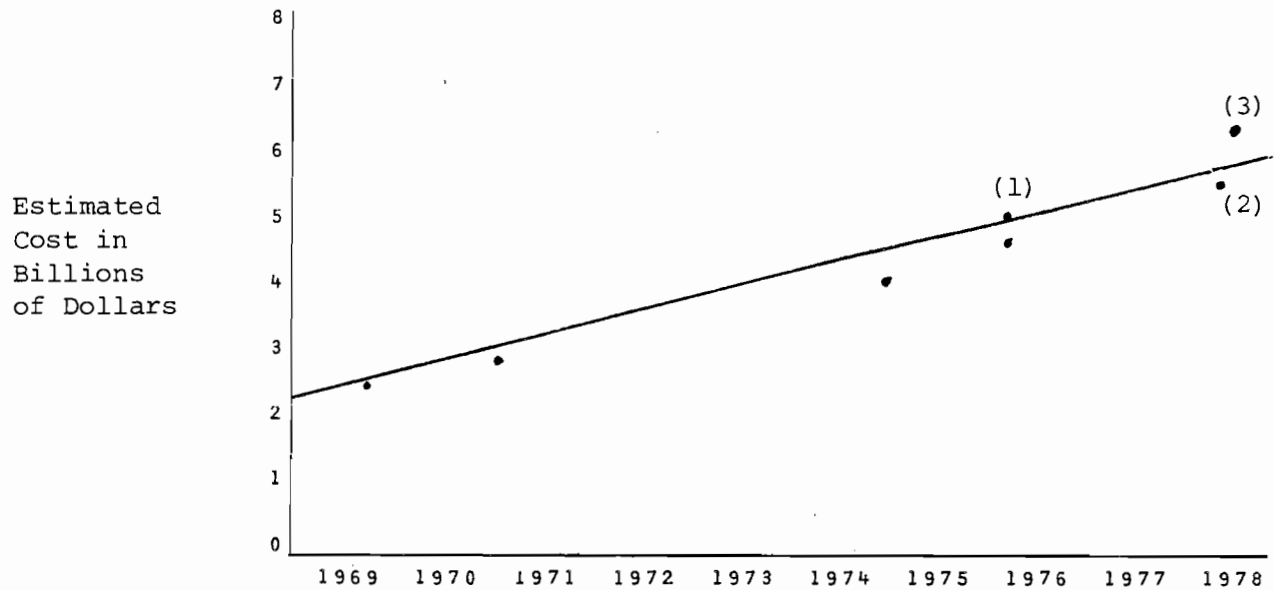
⁶⁰Of course the politically stronger agency may also back the superior mode, in which case the cumulative inequality of resources and evidence determine the decision.

⁶¹In George's (1972) scheme of multiple advocacy equality of resources is sufficiently important so that he stipulates there must be a procedural manager who can attempt to balance things.

⁶²In fact the redundancies which we have studied are interorganizational, and the contrasts in levels of reliability are between a single organization and a multiorganizational set rather than between the individual human and the organization. Strictly, therefore, there is no inconsistency between the work of Allison and other second generation bounded rationality analysts and time dissertation because the organizational pathologies explored are at the same level of analysis.

But in another sense there are important differences because Allison's approach does not include the possibility of changes in reliability between organizational levels, regardless of whether one is moving from the individual to the organization, or from the organization to the multiorganization..

Appendix: Estimates of Metro Costs



Source: WMATA chronology, except for estimate (2), which is from a Baltimore Evening Sun interview with general manager Ted Lutz (6/22/78); and estimate (3), which is a Washington Post quote of a WMATA estimate (8/5/78).

(1) includes, for the first time, an unfunded contingency of nearly .5 billion dollars.

CHAPTER SEVEN

The previous chapter's generalizations were bounded, implicitly or explicitly, by the context of urban transit. What propositions, independently of policy context, can be drawn from the data concerning the desirability of redundancy in government? The first section of this chapter will address that question. In so doing, I note that for evaluating organizational designs the most important assessments are comparative. Thus the question, "is redundancy desirable?" must be modified to read, like the Marx Brothers' joke, "compared to what?" Throughout this study redundancy has been compared to monopoly, wherein there is only one agency per policy area. That comparison will be used in this chapter's first section.

In addition, the last section contains a more challenging evaluative comparison, between redundancy and a process Charles Lindblom calls "partisan mutual adjustment". Comparing redundancy with monopoly, though a natural starting point, is somewhat misleading in the context of American politics. Although monopolistic bureaus do exist, they operate not in vacuums, but in environments studded with other agencies working on related issues. Even if there is only one bureau in a policy area, its programs are scrutinized by agencies affected by the monopolist's action. They will often criticize a proffered option and argue over the merits of alternatives. Lindblom, in his analysis of

this process, has named it "partisan discussion" (1965, p. 28). In partisan discussion a partisan decision-maker "does not assume that there exist some knowable criteria acceptable to him and other decision-makers that is sufficient, if applied, to govern adjustments among them." (ibid, p. 28-29)

Thus partisan discussion is eminently suited to the political environments of American agencies, and it therefore provides a tough final comparison with redundancy. Further, comparing redundancy with monopoly on the one hand and partisan discussion on the other, gives us a broad spectrum of philosophies on policy-making and organizing. Monopoly, with its highly concentrated authority and emphasis on efficiency benefits, is the most rationalistic and least political of the three strategies; partisan discussion, even more than redundancy, rests on the natural politics of a pluralist system.

The comparisons start with monopoly versus redundancy. We then move on to examining redundancy's feasibility, and conclude by comparing redundancy with partisan discussion.

Is Redundancy Desirable?

Redundancy and Monopoly

In evaluating the comparative merits of redundancy and monopoly, I use the five criteria described in Chapter One and repeated here (Table One). The evaluations are based on the case studies. Like any inductive inference, these generalizations are risky. They may also be fruitful.

CRITERIA	PLANNING	OPERATIONS
(1) Probability of error and of error-detection.	<p>(1) Planning in any policy arena is highly uncertain and errors are easily made.</p> <p>Competitive planning is more reliable than monopolistic planning in alerting generalists and superiors to erroneous or questionable factual premises. But competitive planning is not science; the rules of the game are poorly institutionalized.</p> <p>Management is needed to exploit competitive planning's error-detection potential and increase convergence to accurate premises.</p>	<p>(1) Redundancy is more likely to increase a system's ability to <u>absorb</u> errors (reduce their costs) than reduce probability of error. See point (2) below.</p> <p>Using a highly routinized technology reduces error independently of organizational structure. This makes monopoly more viable than it otherwise would be.</p>
(2) Cost of error.	<p>(2) Planning competition is more likely to reduce probability of error than cost of error.* See point (1) above.</p>	<p>(2) Based on these cases, there is little doubt that redundancy operations reduce the cost of errors or malfunction.</p> <p>Unfortunately, because decision-makers may systematically underestimate the frequency (and hence <u>total cost</u>) of errors in complex projects (Kahneman and Tversky, 1974), they may also underestimate redundancy's role.</p>

CRITERIA	PLANNING	OPERATIONS
(3) Cost of redundancy versus cost of monopoly.	(3) <u>Financial</u> costs of monopoly planning are probably usually lower than competitive planning's, but the difference will not be significant. Much more important will be costs of <u>informational overload</u> on higher <u>decision-makers</u> . Competitive planning definitely places more burden on superiors than does monopolistic planning.	(3) Whenever redundant operations involve different technologies, mergers creating monopolies will not produce physical economies-of-scale, and administrative scale economies will not by themselves justify merger. When technologies are the same, the relative cost of redundancy compared to monopoly increases. Based on these cases, one cannot infer whether a redundant strategy costs more than monopoly due to an oversupply of service.
(4) Interactions between type one and type two errors.	(4) There is no evidence that the two structures produce different strengths of interaction between error types. They may produce different frequencies. Because competitive planning is more likely to cause decisional paralysis (superiors unable to choose between rival solutions), it increases the probability of rejecting a strong plan.	(4) In operations, type one error means providing service to people who should not receive it. Type two means not providing it to people who are eligible. Monopoly increases the probability of type two errors; redundancy, the probability of type one. Refining administrative procedures to make services more discriminatingly tar-

CRITERIA	PLANNING	OPERATIONS
(4) Interactions between type one and type two errors. (cont'd)	(4) Monopolistic planning, due to momentum built up when a single agency dominates the choice set, creates a higher probability of accepting a weak plan.	(4) geted are more likely to reduce <u>total</u> type-one, type-two errors than are changes in organizational structure.
(5) Search behavior and the possibility of significant innovation.	(5) Monopoly bureaus' search for alternatives may be broad, but will tend to be superficial. High-risk, high-potential options will particularly be ignored. Monopoly bureaus have little reason to offer innovative programs since doing so disrupts standard operating procedures and personnel. Redundancy increases depth of search into high-risk, high-potential options. Individual competing agencies are no more inclined to disrupt their own personnel and SOP's than are monopolies. The risks of <u>not</u> innovating in a competitive environment are greater than those in a monopolistic one. Further, bureaus new to a policy field may be able to offer programs	(5) There is less scope for significant improvements during operations than during planning under <u>either</u> organizational forms.

CRITERIA	PLANNING	OPERATIONS
(5) Search behavior and the possibility of significant innovation. (cont'd)	(5) that are novel to the field but not to the agency itself, thereby reducing the costs of innovation (see p. 18 below for elaboration).	

* In the case study on planning competition, the selected alternative (buses) would have been a less costly error than rail would have been had the latter been chosen and turned out poorly. Therefore, in this case planning competition could have reduced the cost of error. But I do not know whether this is a general consequence of planning competition. It would depend on details of the alternatives chosen, and I have no reason to believe that competitive planning will result in, e.g., more reversible options than will monopolistic planning.

I wish now to make several general points concerning Table One. First, evaluating redundancy and monopoly is less straightforward than classical public administrationists believed. Multidimensional evaluation replaces the simple wasteful-efficient dichotomy used earlier. Moreover, the strategies entail several trade-offs, (e.g., Criterion Four).

Second, the table says nothing about the relative weights of the criteria. The criteria's significance will vary over programs. For example, consider the early War on Poverty days. With a prosperous economy supporting new government programs, a strong, Presidentially-led coalition trying to eliminate poverty, and a belief that the old welfare programs were ineffective, the most important criterion may have been number five, the possibility of discovering a significant innovation. But when times are lean, and a welfare backlash is threatening, then decision-makers may have to worry most about the trade-off politics of criterion four--providing benefits to ineligibles versus omitting eligibles. We can expect other variations across different policy areas.

Third, the table does not describe the characteristic temporal distribution of the two strategies' benefits and costs. Redundancy constitutes an investment whose return is often long-deferred and sometimes uncertain. Monopoly, on the other hand, frequently pays in the shortrun (removing parallel service does save money), but costs in the longrun when unexpected problems disrupt a taut system.

Fourth, critics may suggest that the table's inductive generalizations have a slender empirical base, and that the case for redundancy is inconclusive. To this I reply, they do and it is. But it must be kept in mind that the empirical warrant for monopoly in government is

yet more slender. Indeed, it is virtually nonexistent. (Organizational ideologies have a way of persisting despite the absence of evidence.) If we imposed equally rigorous methodological standards of evidence upon both strategies, we would be far more organizationally agnostic than we presently are.

Finally, the table does not describe any political implications of the different bureaucratic structures. These will be taken up shortly.

Two Unanticipated Points Concerning Redundancy's Desirability

When doing field research, one expects the unexpected. This study satisfies that proposition. I therefore now wish to discuss two points unmentioned in chapter one. They are (1) the relation between managerial attention and redundancy, and (2) larger political functions of redundancy.

Managerial Attention

Managerial attention is a scarce and valuable resource in any organization, and the allocation of this resource is influenced by organizational structure. Functional organization sweeps related programs into one agency, with no institutional mechanism for ensuring a reasonable distribution of managerial attention. And attention often is maldistributed due to the presence of an organizational mission.¹ An organizational mission includes more than an agency's function. It usually identifies a specific solution or means as central to accomplishing a function. And in a functionally organized agency, the solution identified as part of the organizational mission will receive the lion's share of managerial attention.²

Organizational missions develop for several reasons. (a) An important leader may identify himself with, and lend prestige to, a particular program. (b) An organization may have integrated backwards into education, as do the armed services, and during the intensive college years recruits learn specific skills (collectively constituting a program) which they identify as the central mission. (c) Some alternatives are more glamorous than others. A policy's sex appeal may go unexamined in public policy essays, but it exists and has effects.³ Glamour facilitates the formation of organizational missions by making certain options more prestigious. (d) Identifying a solution as organizationally central reduces uncertainty, and simplifies training and procurement in the bargain.

Whatever the causes of organizational missions, the result is that managerial attention in a monopolistic, functionally integrated agency tends to focus on the program defined as the mission. Though occasionally this allocation reflects clientele preferences, often it results from intraorganizational conditions (such as those above) unrelated to clients' welfare. The Washington Metro case illustrated this point dramatically.

Political Implications of Redundancy

The most studied case of public organizational competition has been defense. In one respect this policy area is misleading. Defense is a public good: service provided to some is provided to all. Hence clientele diversity, and the effectiveness of redundancy in accomodating diversity, have not figured in studies of armed services' rivalry. But many governmentally supplied services (education, transit, manpower programs) are not pure public goods. They are consumed by individuals, and the diverse preferences of individuals in a jurisdiction is an important

element for these policies' designs.

I hypothesize that for nonpublic goods, the greater the clientele diversity in a jurisdiction, the more desirable is redundancy. A monopoly bureau is likely to tailor programs for a specific interest group, while overlooking other groups' interests. Often this is a matter of survival, for agencies tend to adapt to the powerful in their task environment (Selznick, 1949). Often it is a matter of convenience, for it is administratively easier to design programs for homogeneous clients. Diverse clients often require different equipment, skills, or even new programs.

Whatever the cause of selective orientation, the political costs of monopoly bureaus in heterogeneous task environments can be substantial. To those not in the chosen narrow clientele group, bureaucratic behavior may appear arbitrary and capricious.⁴ Service designed for one group may appear unfair to others. Blacks in Southeast Washington, for example, probably considered the rearrangement of their transit system unreasonable--and so it was, from their perspective and for their interests. Yet it made good sense for long distance commuters. Multiple bureaus, using personnel with different expertise, with different equipment, and with diverse programs, will satisfy a broader range of persons.⁵

A corollary of this argument is that redundancy in heterogeneous task environments is more desirable when representative political institutions are weak. When agencies of representation are strong, diverse interest groups can use them to influence even monopolistic bureaus. But if they are weak, redundant bureaus, by offering programmatic choices, can produce a protodemocracy and crudely substitute for electoral representation. We recall that whereas in the AC-BART case, elected officials were uninvolved, in Washington Metro is more closely watched by electorally

staffed institutions, compensating for Metro's monopolistic status.

Is Redundancy Feasible?

Desirability is one thing; practicality, another. Theory and some evidence may suggest that instituting bureaucratic redundancy could improve the performance of public organizations. But is the strategy organizationally and politically feasible? A desirable but infeasible strategy is utopian, and one intention behind the early theorizing on redundancy was to avoid utopian designs. Several generalizations can be extracted from this study, suggesting conditions which increase redundancy's practicality.

(1) The probability of a premature quashing of redundancy is diminished if overlapping agencies use different technologies. As in the AC-BART case, different technologies promote a (possibly false) expectation that they will be deployed for different ends, whereas identical technologies make redundancy highly visible, and vulnerable. Indeed, until a problem is significant enough to be categorized on the national agenda as a policy area, alternative solutions embodied in different technologies may not even be considered functional substitutes. It has been suggested, for example, that until the energy crisis broke in 1973, Congressmen were not troubled that no single department had jurisdiction over energy programs.⁶ Coal was in Interior and nuclear in the AEC, yet there was no hue and cry to eliminate fragmentation and organize functionally. Congressmen probably categorized programs by technology rather than by use, thus not seeing them as alternatives.

(2) If bureaus overlap rather than exactly duplicate or match each

other's functions, redundancy is more tolerable politically. Organizational existence is less threatened by overlap, for it enables organizations to retreat to domains that are theirs alone. Consequently they will try less vigorously, and less viciously, to oust interlopers.

(3) The above point is complemented by the next. A well-established agency can mobilize its political resources to bar newcomers to its policy field. It is not accidental that both my redundant cases involved agencies that started almost simultaneously. None of the organizations were sufficiently entrenched to repel others from their turf. This complements point (2) because in each pair, each agency could delude itself into believing that eventually the relationship would become completely differentiated. In Twin Cities the organizations, during their fragile early years, devoted themselves to different missions. In the Bay Area, the different technologies combined with partly disjoint service areas and different lead-times, producing in their early years nonoverlapping activities (AC operating, BART planning). Hence both temporally and spatially these two only overlapped rather than fully duplicated (see figure 1).

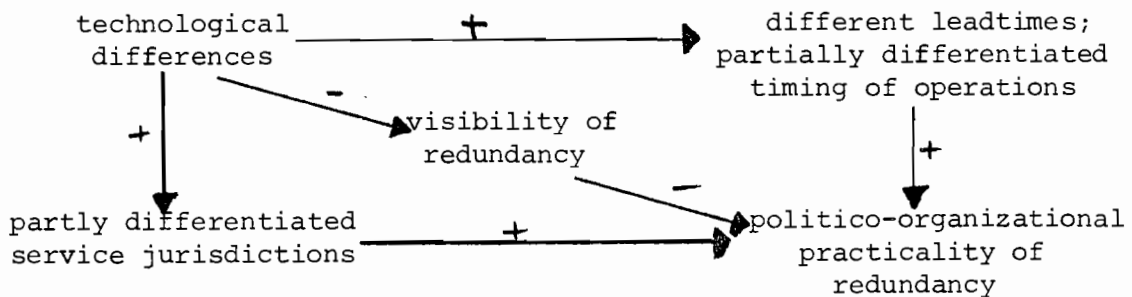


Fig. One

(4) Redundancy is more stable, and therefore more practical, if overlapping bureaus do not have a powerful superior authority close at hand. In Minneapolis, where the state Legislature is active in metropolitan politics, the redundancy was ended quickly, whereas in the Bay Area, where state government has historically been remote from regional governmental organization, the overlap persists. Though a few higher-ups may promote redundancy, I believe superiors more often reorganize duplication out of existence than they promote it.

For this reason redundancy is probably more feasible among special districts than among regular departments, because districts are less frequently embedded in hierarchies. It also follows that in departments, redundancy is more feasible in decentralized organizations. In these bureaucratic entrepreneurs can intrude on each other's domains, without nice regard for jurisdictional proprieties and without fearing that such actions will be killed by hierarchical fiat.

(5) Chapter one explored the practicality of lateral redundancies, in which agencies are hierarchically equal. Vertical redundancies, in which superiors and subordinates overlap, is another avenue for instituting duplication. We recall that it was easy for the Metro Council to assert itself and move in on transit planning. First, it had the authority to do so. Second, the means-end relations between the two organizations were intrinsically fuzzy. And this ambiguity is inherent in hierarchical relations, for the superior's specifying goals and performance criteria can go far towards selecting means.

But the feasibility of vertical redundancies is constrained by the limited resources of superiors. They can intervene only selectively in subordinates' jurisdictions. Further, vertical redundancies are

inherently unstable. What hierarchy giveth, hierarchy taketh away. If a superior agency or division wants part of a jurisdiction, the subordinate will usually be removed from the field. The result will be a substitution of one actor for another, rather than redundant actors.

(6) Finally, the reader will recall that independent channels is a functional requisite of redundant systems. Whether parallel agencies can remain independent is the knottiest problem in the pragmatics of redundancy theory. It is particularly problematic during planning. Independent channels in planning requires diversity, comprehending mind-sets, planning assumptions, and predispositions for and against classes of solutions.

This obstacle to implementing redundancy has not gone unnoticed. Steven Chan claims that similar patterns of recruitment and socialization in the intelligence community militate against genuine diversity in intellectual perspectives or methods (1979, p. 177-178). Lawrence Pierce, describing fiscal policy-making, refers to an "incestuous process" involving similarly trained economists whose "interbreeding ideas" seem to come out the same (1971, p. 56-57).⁷

In addition to recruitment and socialization difficulties, competing bureaus may eliminate programmatic differences by converging toward a middle position in a policy space (Downs, 1957, p. 117).⁸ Then competing bureaus, like competing political parties, could be accused of offering a Tweedledee-Tweedledum choice: the shadow but not the substance of diversity.

What can we infer from the data? First, the cases show diversity can be sustained for a while at least. It does not inevitably decay.⁹ Second, diversity does not necessarily require agencies with different

specialities. As in Minneapolis, generalists can develop various visions of the future. Passionate commitments to visions, though they also have negative side-effects, sustain diverse approaches over long periods.¹⁰

Third, a conscious attempt by agency leaders to preserve a sense of organizational culture will help maintain independence.¹¹ Every organization develops its own folkways and traditions.¹² These can internally inhibit convergence toward median policy positions. Although bureaucracies are not representative institutions, leaders are somewhat influenced by the led, and a widespread sense of what an agency is about can inhibit opportunistic blurring of difference by leaders.

Fourth, investment in durable equipment sustains diversity. AC is unlikely to discard buses in favor of trains; the Navy is unlikely to discard Polaris for ICBM's. (Obviously this point pertains to operations, not to planning.)

Finally, whether duplicating bureaus remain independent will often depend on diversity in the surrounding social system, on the educational system and the structure of professions and skill groups in society. If functional specialities are broken down into subspecialities, with their own technologies and traditions, then organizations will be staffed more diversely. For example, in transportation schools, students might be directed into subspecialities of highway planning and transit planning, or they might all be trained as broad-gauged transportation planners. Or students might be trained as nuclear engineers versus solar specialists, or trained to think functionally as energy engineers. Although the narrower education may promote "the deformation of the specialist", it also prevents a bland sameness being produced in functional areas. If all experts in a policy area have been exposed to the same options (and

biases), then bureaus will have less diversity to draw upon. Of course, because bureaus cannot influence the degree of differentiation in the social system, they must consider it a parameter to which they must adjust.¹³

Qualifications

Earlier I argued that one could generalize from the case of urban transit to the general applicability of redundancy to government. But selecting urban transit as my empirical focus does limit the inferences that can be drawn from the data. I see three limitations.

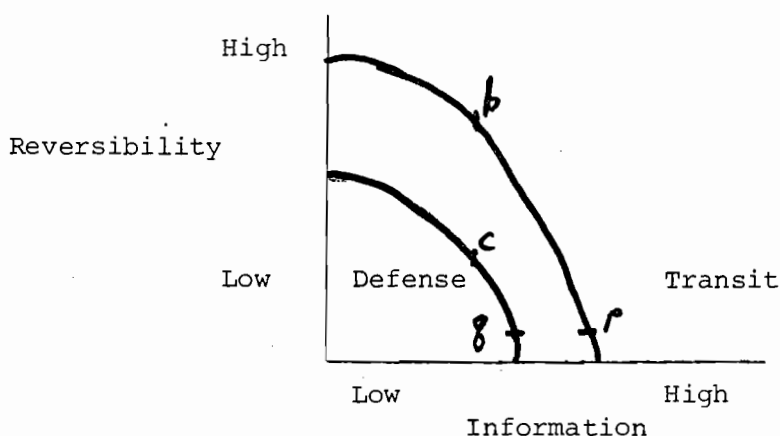
(1) Many other programs would not have such a high proportion of expenditures locked up in highly specialized, durable equipment. Consequently, mistakes are more reversible, alternative solutions can compete longer, and "pruning rules" on when to trim back parallel projects could be relaxed.

Because the capital intensity of this study's competing alternatives (rail and bus) differed so greatly, the modes were asymmetrically reversible during operation. This complicating feature of redundancy would not occur in many policy areas where alternatives vary less greatly on this dimension.¹⁴

(2) Until recently, the private sector supplied most urban transit. This history of market supply increased the familiarity and perhaps the legitimacy of competitive and noncompetitive redundancies. Policy areas of an exclusively public history will be more prone to monopoly, and probably more resistant to attempts to make them competitive.

(3) Policy areas vary greatly in terms of measureability of performance. Although estimating longrun effects of building a transit

system is a formidable task, one can certainly establish short-term performance indicators on, e.g., schedule reliability or passenger miles/cost.¹⁵ In other domains, notably but not exclusively defense, it is much more difficult determining an alternative's performance in the final operating environment (i.e., war).¹⁶ The postulated tradeoff curve between information and reversibility is then closer to the origin (see hypothetical Fig. One) than is transit's curve.



To get the same amount of information on alternatives, one must accept less reversibility (compare points b and c) and more difficulty correcting mistakes. If decisions are equally reversible in the two policy areas, then less information will be had in defense (p and q). The poorer trade-off means all problem-solving strategies do more poorly, and not that redundancy is not useful.¹⁷

Redundancy and Partisan Discussion¹⁸

Partisan discussion is already well entrenched in American government. Few major issues arise that do not stimulate interdependent, differentiated decision-makers to argue over policies' merits. Partisan

discussion rests on the dispersed authority, interdependent policy sectors, and goal dissensus which mark American political life. For these reasons it is the most practical alternative to the strategy of redundant bureaus.

Before evaluating the worth of the strategies, we must observe their differences and similarities. Concerning similarities, we note that they derive from similarly skeptical traditions, share the same doubt about any venture's certainty, and emphasize the benefits of multiple decision units. In a series of works culminating with The Intelligence of Democracy, Lindblom has delineated how multi-unit decisionmaking can ameliorate problems caused by constraints on cognition and on the ability to agree on goals.¹⁹ This line of analysis is highly congenial to redundancy theory.

But Lindblom's model of decisionmaker multiplicity emphasizes differentiation by value or interest, not redundancy (1965, p. 151, 156). His scheme does not assume that agencies functionally overlap; specialization is the hallmark of both partisan mutual adjustment and partisan discussion. For example, decisionmakers may specialize in environmental and macroeconomic policy. A policy alternative of one (EPA, e.g.,) might aggravate the other's problem (inflation), provoking the latter specialist to issue criticisms. This initiates a cycle of partisan discussion.

Several readers acknowledged the process dissimilarities, but inquired whether the difference between differentiation in partisan discussion and overlap in bureaucratic redundancy affected policy outcomes. It was suggested that an iterative cycle of partisan discussion in which an agency makes a proposal that is criticized, modified, put forward again, and so forth would be functionally equivalent to planning compe-

tition. Indeed, Lindblom himself suggests that partisan discussion has the same informational effect that planning competition has. He quotes a legislator speaking of interest groups, "Both sides come around to you, so you can balance off all one-sided presentations (and they're all one-sided)" (1968, p. 66).²⁰

Hypothesized Outcome Differences

Partisan discussion does have several advantages.

First, the technical or engineering views of problem-solving redundancies (e.g., Nelson, 1961) presume more goal consensus²¹ than does partisan discussion. (Recall Lindblom's definition of a partisan decisionmaker, above.) In these narrow formulations²² of redundancy, parallel problem-solving efforts are directed toward a well-defined problem. Rarely do issues in the public sector admit of such pristine strategies.²³ Partisan discussion is more realistic in this respect.

Second, partisan discussion is more robust because it is predicated on differentiation, which is far more legitimate in the American political system than is duplication.

Third, due to Lindblom's longstanding interest in remedial and serial policy-making, partisan discussion does not require a simultaneous evaluation of alternatives. Partisan critics of one policy

are not required, as they would be by the synoptic ideal, to bring their anticipation of failures to bear as an objection on the very policy that stimulates the anticipation. Instead they more simply employ the anticipation by designing a next step to deal with the anticipated failure or adverse consequence of the last step.

(1965, p. 156)

This is probably more realistic than the planning competition model, which (though not synoptic) requires a simultaneous or functionally simultaneous²⁴ review of rivals' programs.

Fourth, partisan discussion does not depend on a carefully orchestrated "multiple advocacy" (George, 1972) requiring resource parity and centralized management. (But in return for not stipulating demanding prerequisites, Lindblom does not contend that partisan discussion is very powerful normatively.)²⁵ Thus partisan analysis is both more likely to occur and to remain stable.²⁶

Finally; partisan analysis does not require creating detailed alternatives, but only critiques and modifications of others' options. It is therefore more easily done by nongovernmental groups with their limited resources.²⁷

In exchange for these advantages, partisan analysis is less likely to produce detailed policy alternatives because the lead agency has a vested interest in its option, and because all too frequently the criticism phase of partisan discussion comes too late in the policymaking sequence to affect much.²⁸ Partisan discussion's sequentiality requires relying on the correctability of mistakes²⁹ and the ability of a system to avoid being locked in to old solutions.³⁰ In the policy studied here, that assumption was not satisfied. I hypothesize there is in general a greater chance of becoming "locked-in" to a particular policy alternative under a differentiated structure of partisan discussion than under a redundant one.

One might argue that policies in partisan discussion systems do change; they just do so incrementally. One could further argue that most bureaus, whether redundant or monopolistic, change their programs only

incrementally. They do so to conserve the knowledge and equipment invested in specific solutions, and in general because of bounded rationality considerations (Simon, 1947; Braybrooke and Lindblom, 1963). But this point would not vitiate my contention that politics with monopolistic bureaus are in greater danger of programmatic sluggishness than those with redundant agencies. The limited adaptability of a single organization translates into systemic incrementalism only if component incrementalism is compounded by monopoly status. Consider the following.

Suppose we accept that bureaus change incrementally.³¹ Nevertheless, note that an incremental shift for a new actor in a policy arena may be quite novel for established, older actors. For example, when congestion confronts highway engineers, the professional standard operating procedure is to increase highway capacity. Transportation economists, facing the same stimulus, would probably recommend peakload pricing the scarce resource. This would be a non-incremental response, measured by the history of highway planning. Yet applying scarcity pricing to transport facilities is certainly not a novel proposal for economists. For them it is just an incremental extension of a well-established principle.

Thus incrementalism at the actor level and innovation at the system level are compatible, but only in systems with redundant policy generators.³² In partisan discussion systems, where by hypothesis monopoly bureaus are also oriented toward incremental change, innovations are less feasible. The sluggishness of an entrenched bureau is challenged only by critics who do not themselves offer alternatives. Criticizing a program which itself departs only incrementally from the status quo is unlikely to make the program innovative. Criticism in partisan discussion is more likely

to spot holes in weak options than to produce high-risk, high potential alternatives.

I have ended this study by comparing redundancy with differentiated partisan discussion because it is the toughest comparison I, or readers, could think of (far tougher than comparing redundancy with monopoly), and not because I advocate replacing one by the other. Partisan discussion is indispensable: it is flexible, easily deployed, and easily produced by a variety of inter-organizational arrangements. Yet its practicality should not obscure the possibility that for important issues it may have to be supplemented by redundancy, which promises a more probing exploration of a wider range of options.

Whatever their differences, both strategies find a common theoretical justification in the framework of bounded rationality. And pragmatically, both seek systemic compensation for subsystemic unreliability. Their pragmatic similarity is unsurprising because normatively a bounded rationality perspective directs one to consider organizational systems with large disparities between the reliability of part and whole. This is exactly the opposite of the equivalence implied by Allison and others between individual and collective limits on rationality. It is of course quite possible that their descriptions of organizational unreliability are accurate, but prescriptively one should take a more complex view towards the relation between part and whole reliability.³³ The popular literature on bureaucracies is replete with examples of smart people in mediocre organizations; the converse of ordinary people in smart organizations remains a design problem.

Footnotes

¹Morton Halperin discusses this topic in different terms. "The organization's essence is the view held by the dominant group in the organization of what the missions and capabilities should be" (1974, p. 28). Halperin observes there may be conflict over organizational essence within a single agency.

²Managerial attention could be misallocated even when programs do not functionally overlap, because attention is a scarce resource which could be devoted to any programs, redundant or complementary. But I think skewing is particularly likely when programs are functional substitutes, because there is then a stronger belief that a commitment must be made to one or the other.

³I define the glamor or sex appeal of a policy as its instrumentally irrelevant attractiveness. Policy glamor may be hard to articulate, but it is easy to recognize. In this study many interviewees remarked spontaneously that rapid rail is much more sexy than buses.

⁴If a monopolistic bureau is in a homogeneous task environment, the probability of it behaving willfully or despotically would be much lower. Monopolistic bureaus can afford to be more arrogant than redundant ones, but even they can rarely ignore a homogeneous clientele.

⁵Recall that the combined transit system of AC and BART wound up satisfying a wider set of patrons (local as well as commuters) than

did Metro, which discomfitted many inner city riders by bending bus routes to serve rail. We must stress that this difference was not due to rivalry between AC-BART and ensuing responsiveness to clients' preferences (as hypothesized in Chapter One). Structural redundancy, not behavioral competition, produced the greater diversity of options.

⁶Stuart Ross suggested this to me; private conversation, Spring, 1978.

⁷I suspect Pierce overestimates the similarities. Chicago- and Yale-trained economists probably regard, e.g., governmental intervention in the economy very differently.

⁸This point was raised by several listeners during a talk on redundancy given at the Stanford Business School.

⁹Even though there is no guarantee that the cases are typical, it is reassuring that in neither of the two redundant pairs of agencies did diversity disappear.

¹⁰This is, to borrow Thomas Kuhn's phrase, one positive function of dogma.

¹¹I thank Martin Landau for suggesting this point.

¹²It may appear this point contradicts the argument on organizational missions. Earlier I noted negative effects of organizational missions; here I point to positive effects of unique organizational traditions. And yet part of an agency's tradition is its mission.

The difference is that the discussion on missions presumed integrated organizations dominating their functional fields, whereas the discussion on organizational culture presumed several organizations in the same field. In the former case, if an organizational mission develops, covering only one of the functionally equivalent programs in the agency, the others will tend to be starved. But when there is organ-

izational redundancy, then unique agency cultures tend to preserve diversity rather than imposing homogeneity.

¹³There are exceptions. The United States' armed forces have a tradition of "integrating backwards" by educating their own recruits. This breaks down the functional group of "specialists in violence" into subspecialities. Higher French public administration also has its own schools, but these may increase rather than decrease homogeneity.

¹⁴Though in a few others, such as energy, such differences would apply.

¹⁵This is being done around the United States. In the Bay Area, MTC and the big six operators have agreed on a set of performance indicators.

¹⁶In fact, exactly what any given weapon's operating environment will look like is clouded in uncertainty.

¹⁷I once thought that a fourth limitation on generalizations was that the politics of redundant transit operations would be more intense than those in many other policy fields because transit is not a public good. The argument was the following. First, suppose it could be shown that redundant transit organizations supply more service than do monopolies. Second, transit is privately consumed but publicly subsidized. Thus nonriding taxpayers would have to pay more to support a redundant system than a monopolistic one. Third, services such as defense that are collectively consumed cannot encounter this difficulty since nonusers do not exist.

But the argument does not hold. Citizens, though they cannot consume different amounts of a public good, can and do want different amounts. Therefore, if premise one is correct (redundant organizations

supply more service), then those preferring less of a public good would still want it supplied monopolistically. Consequently, the politics of redundancy in public and nonpublic goods would not differ on this dimension.

¹⁸To compare redundancy with the entire scope of partisan mutual adjustment processes would be pointless, as it includes such a large number of substrategies. Indeed, one of the weaknesses of Lindblom's (1965) analysis is that it is not easy to discern what is not in the set, beyond the most centralized forms of decision-making. Consequently it is too easy to make performance claims for it.

¹⁹This was his task in part. The major purpose in Intelligence was to show how coordination could be achieved without a coordinator.

²⁰See also The Intelligence of Democracy: "No one decision-maker is motivated to undertake the comprehensive investigations envisaged by the advocates of an overview, but, taken together, a group of partisan adjusters may generate a great deal more information and analysis than will a central coordinator. Again, they will not necessarily do so, but they may" (p. 174).

²¹However, solutions to reasonably complex problems are invariably multi-dimensional, and wanting a set of weights so the dimensions can be collapsed into a single metric, there can be quasi-political, quasi-technical fights over the merits of competing solutions as the different dimensions become proximate goals. This tendency is enhanced if the dimensions are differentially important to different organizations, as in, e.g., the TFX affair.

²²These are more narrow than the discursive expositions of Klein and Landau largely in order to facilitate formal modelling and identification of optimal amounts of parallel path redundancy in development

projects. Optimality cannot of course be identified without consensual criteria of evaluation.

²³See also Lindblom's point that "by definition cooperative problem-solving through discussion in the light of adequate and agreed criteria is ruled out as not belonging to the present category of partisan adjustment" (p. 69).

²⁴By functionally simultaneous redundancy, I mean that a review of rival solutions is conducted before any important decision is made. The review need not be literally simultaneous.

²⁵Actually both George's multiple advocacy and Lindblom's partisan mutual adjustment are subject to the same tradeoff between practicality and effectiveness. Multiple advocacy would be more robust and widespread if results would be more distorted from the analytical point of view. Similarly partisan mutual adjustment is liable to distortion if the actors are of unequal strength, but it would be much less widespread if parity were required.

The central weakness of George's design is implementation. As Destler noted, it is unlikely that a design as complex as his will be established by the White House or other top political executives (1972). Lindblom, on the other hand, emphasizes the feasibility of partisan mutual adjustment, and tends to skirt the issue of its desirability. George pays more attention to the dysfunctional effects of partisans dividing up the market, buying off weaker competition, and so forth (p. 761). Indeed, what we have termed competitors colluding would in Lindblom's scheme be an instance of partisan mutual adjustment! I think that it can be fairly said that Lindblom's analysis is insufficiently discriminating concerning when partisan mutual adjustment is benign, and for whom. But given the condition under which the strategy functions--goal dissensus--

it might be a difficult task in normative political theory to devise criteria to evaluate it.

²⁶The planning competition studied here, because it involved undesigned and unmanaged redundancies, is more practical than George's multiple advocacy. At the same time, however, due to a lack of emphasis on the "due process" in the competitive planning case, its normative claims must be weaker than those of multiple advocacy.

²⁷Though the Minneapolis case indicates that redundant generation of policy alternatives is not completely restricted to governmental organizations: the Personal Rapid Transit group was nongovernmental.

²⁸This conclusion partly depends on the political clout of the generating and commenting bureaus, and the salience of the values they are guarding. In the example chose (environment versus inflation), the importance of the latter to the nation, and more to the point, to the White House, ensures that criticisms will be heard.

²⁹Purely sequential forms of redundancy may not work well either. In an experiment on different kinds of redundancy, Felsenthal and Fuchs found that the sequential type was not effective, particularly if a redundant problem-solver was attempting to answer a question which had been solved incorrectly by two preceding problem-solvers (1976, p. 474-475).

³⁰Though in Chapter One it was assumed that the sequential decision-making strategy would be carried out by the same group, whereas Lindblom posits that the sequence of new moves would be undertaken by the critics of the first move.

³¹Here I mean not the error-correcting sense of incrementalism, but the sense of small departures from the status quo. See Wildavsky's remarks on this distinction (1974, p. xiii).

³²Of course even in such systems proposals which are drastic departures from the status quo may be modified by opposing groups (e.g., car drivers, in the above example). But the incrementalism which results is not because of bounded rationality factors which Braybrooke and Lindblom pointed to, but because of predictable policy outcomes which are unacceptable to certain interests. See Hammond and Knott's distinction between analytical and political incrementalism (forthcoming).

³³Interorganizational compensation for organizational pathologies was not a topic in Allison's Essence of Decision, probably the most influential of the second generation works in organization theory using the theory of bounded rationality. Why was this topic omitted? This author can think of two reasons. First, implicitly Allison's Model Two (Organizational Process) assumes that large complex entities such as organizations would have no more diversity--of professional background, mindset, and action routines--than the individuals which compose the organization. At a different level of analysis, the analogous assumption would be that still larger multi-organizational complexes would have no more diversity than single organizations.

Second, the omission may have been due to Allison's distinction between Model Two and Model Three (Bureaucratic Politics), and the lack of interplay between them. Allison's Model Two includes no discussion of the role that conflict might play in organizational decisionmaking; that is relegated to Model Three. There was, therefore, no exploration of possible tension between the internal routines of a single organization and external threats to the monopoly status of those routines. Allison's Model Two bureaucracy lives in a placid environment where there is no danger of jurisdictional displacement. His Model Three actors, on the

other hand, live in a world which is constantly political, but the Model does not specify how this politicized environment can change the content of bureaucratic routines and programs over time.

It is a pity that these aspects of Models Two and Three were not combined. A model of a population of rigid, competing, and programmatically diverse bureaus could have led to some interesting insights concerning the relation between subsystemic inflexibility and the capacities of a larger system.

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