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ESSAY

SYSTEMS ANALYSIS, MICROCOMPUTERS, AND THE JUDICIAL PROCESS

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I. INTRODUCTION

The use of systems analysis and microcomputers can be of great assistance in understanding and improving the efficiency of judicial decision-making and judicial administration. In this context, systems analysis processes the goals to be achieved, the alternatives available for achieving the goals, and the relationships between the goals and the alternatives. The objective of systems analysis is to find the most appropriate alternative, or combination of alternatives, necessary to achieve the desired goals. Consequently, systems analysis can develop a rule to predict the outcome of a particular case or to explain the behavior of a court in any given case. Due to the numerous combinations of alternatives, microcomputers are essential to processing the goals, alternatives, and relations.

When considering systems analysis and microcomputers, the judicial process can be divided into two parts. The first part concerns judicial decision-making. Systems analysis can predict judicial decisions in light of past decisions and can prescribe policy and trial decisions in light of the goals to be achieved. The second part of the judicial process concerns judicial administration. Systems analysis and microcomputers can assist in orderly judicial administration by assigning judges to particular types of cases, by efficiently sequencing cases and by allocating cases to alternative methods of dispute resolution. In short, systems analysis can develop procedures to improve the effectiveness, efficiency and equity of the judicial process.

The microcomputer software described in this article is generally

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categorized as multi-criteria decision-making software (MCDMS). The particular software package used to generate the materials contained in this article is known as Policy/Goal Percentaging (P/G%). This software package, as indicated by its name, relates policies or decisions to goals or criteria, and utilizes part/whole percentaging to measure goals in different ways.[1]

II. JUDICIAL DECISION-MAKING: PREDICTING DECISIONS IN LIGHT OF PAST DECISIONS AND PRESENT FACTS

There are three common techniques that are relevant to predicting judicial decisions that lend themselves to systems analysis. These techniques correspond to the briefing of individual appellate cases, to synthesizing sets of cases, and to fact-finding at the trial court level.

A. Using MCDMS to Brief Appellate Cases

An instructive example of how P/G% software is used to brief an appellate case may be found in the analysis of the United States Supreme Court decision in *San Antonio v. Rodriguez*.[2] Table 1 reveals the analysis of the *Rodriguez* decision as generated by the P/G% software.

In *Rodriguez*, the plaintiffs brought a class action suit on behalf of members of minority groups and the poor who resided in the Texas school districts that had a low property tax base.[3] The suit attacked the system of financing used to allocate funds to the state's public elementary and secondary schools.[4] The plaintiffs alleged that Texas' reliance on local property taxes to finance schools favored the more affluent and, therefore, violated the equal protection clause.[5] The plaintiffs argued that substantial interdistrict disparities in per-pupil expenditures resulted primarily from differences in the value of assessable property in the districts.[6] The United States Supreme Court, finding that the disparities in per-pupil expenditures were not the result of invidious discrimination, held that the Texas system of school funding did not vio-

1. *See generally* S. NAGEL, DECISION-AIDING SOFTWARE AND LEGAL DECISION-MAKING (1989); S. NAGEL, MICROCOMPUTERS AS DECISON AIDS IN LAW PRACTICE (1987) (presenting general backround information on multi-criteria decision-making applied during the legal process); S. NAGEL, EVALUATION ANALYSIS WITH MICROCOMPUTERS (1989) (presenting a general discussion on the methodology employed with multi-criteria decision-making).

2. 411 U.S. 1 (1973).

3. *Id.* at 4–5.

4. *Id.* at 1.

5. U.S. CONST. amend. XIV, § 1.

6. *Rodriguez*, 411 U.S. at 1.

TABLE 1. BRIEFING AN APPELLATE CASE: *SAN ANTONIO v. RODRIGUEZ*

A. ALTERNATIVES AND CRITERIA

Alternative	Previous Outcome		Criterion	Meas. Unit	Weight
1 NO EQUALITY REQD.	YES	1	EDUCATED POP.	1-3	1.00
2 = $ PER STUDENT	NO	2	-DISCONTENT		1.00
3 MIN. $ PER STUDENT	NO	3	-DOWNGRADING		1.00
4 HIGH $ PER STUDENT	NO	4	ADMIN. EASE		1.00
5 OTHER	?	5	CONSIST. W/CASES		1.00
		6	-EXPENSE		1.00

B. SCORES OF THE ALTERNATIVES ON THE CRITERIA

	EDUCATED	-DISCON	-DOWNGR	ADMIN.EA	CONSIST.	-EXPENSE
NO EQUALITY REQD.	1.00	1.00	3.00	3.00	2.00	3.00
= $ PER STUDENT	2.00	2.00	1.00	1.00	2.00	2.00
MIN. $ PER STUDENT	2.00	2.00	2.00	1.00	2.00	1.50
HIGH $ PER STUDENT	3.00	3.00	2.00	1.00	1.00	1.00

C. TOTAL SCORES OF THE ALTERNATIVES

Alternative	Combined Raw Scores	Previous Outcome
NO EQUALITY REQD.	13.00	YES
= $ PER STUDENT	10.00	NO
MIN. $ PER STUDENT	10.50	NO
HIGH $ PER STUDENT	11.00	NO

D. CHANGES NECESSARY TO ELEVATE THE SECOND PLACE ALTERNATIVE TO FIRST PLACE

	NO EQUALITY	MIN. $ PER	Weight
EDUCATED POP.	-1.50	4.50	3.500
-DISCONTENT	-1.50	4.50	3.500
-DOWNGRADING	0.50	4.50	-1.500
ADMIN. EASE	0.50	3.50	-0.250
CONSIST. W/CASES	-0.50	4.50	?
-EXPENSE	0.50	4.00	-0.667

late the equal protection clause of the fourteenth amendment.[7]

The first part of the brief contained in section A of Table 1 indicates that the Court was faced with four alternative decisions in *Rodriguez*. The Court could have found that no equality in per-pupil expenditures is required by the equal protection clause; that equal expenditures per-pupil is constitutionally mandated; that a minimum amount of expenditures per-pupil is required; or that per-pupil expenditures must be equivalent across the board, but at a level higher than some minimal amount of expenditures. Section A of the brief detailed in Table 1 demonstrates that the Court found the no equality alternative to be the most sound position.[8]

The second section of the brief contained in Table 1, section A, demonstrates that there were six relevant criteria for the *Rodriguez* Court to consider in deciding the case. The criteria include: (1) the desire for having an educated population; (2) the need for decreasing the discontent among parents and students due to educational opportunity disparities; (3) the prospect of reducing the quality of education available in affluent areas resulting from forced equalization of per-pupil expenditures; (4) the promotion of administrative ease and efficiency; (5) the consistency of a decision with prior case law; and (6) the desire to avoid a heavy expense to the taxpayer.

The third section of the brief indicated in Table 1, section B, is devoted to demonstrating how each alternative scored on each of the six criteria. The alternatives were scored using a simple 1–3 scale. A score of 3 is the equivalent of an alternative that is conducive to the goal; a score of 2 indicates an alternative neither conducive nor adverse to the achievement of the goal; a score of 1 is the equivalent of an alternative adverse to the stated goal.

The fourth section of the brief contained in Table 1, section C, reveals the combined raw scores for each alternative using the apparent scoring of the Supreme Court. The alternative with the highest combined raw score would predict the alternative that the United States Supreme Court ultimately adopted, namely that the equal protection clause does not require that per-pupil expenditures be equal across the state.

The final part of the brief contained in Table 1, section D, is the threshold analysis of the *Rodriguez* case. The program determined that the first place alternative was the "no equity" alternative, and the second place alternative was the "minimum dollar per student" alternative. Furthermore, the analysis indicates the factors that would be nec-

7. *Id.* at 55.
8. *Id.*

essary to increase the second place alternative to the most optimal alternative for the Court. There was a gap of 2.50 points between the first and second place alternatives' combined raw scores. That disparity in points would be eliminated if the "no equality" alternative were to drop by 2.50 points on any of the six criteria. Such a decrease in points, however, would not be possible because the lowest score available on any one criterion is 1.00. The disparity in points could also be eliminated if the second place alternative, having a "minimum number of dollars per student," were to increase by 2.50 points on any of the six criteria. Again, such an increase is inconceivable since the highest score available on any one criterion is 3.00.[9]

The gap, however, could feasibly be eliminated if the United States Supreme Court were to place substantially more weight on having an educated population or on decreasing discontent among students and parents due to educational inequities. The two foregoing criteria are considerations that advocates of a minimum dollars position would emphasize because it would raise the score of that alternative. The disparity in combined raw scores would also be eliminated if the other criteria were given negative weights, but such a situation is unlikely. Changing the weight given would not assist in achieving the desired consistency with prior case law, since both alternatives scored the same on that criterion.

B. Using MCDMS To Synthesize Sets of Appellate Cases

An example of synthesizing a set of appellate cases utilizing P/G% software is revealed in Table 2. The line of appellate cases consists of nine decisions concerning legislative redistricting, beginning with the 1948 decision in *Colegrove v. Green*[10] and concluding with *Baker v. Carr*,[11] which was in decided 1962.[12] Each of the nine selected cases is scored with a 2 for a positive answer and a 1 for a negative

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9. The following sources provide the reader with a general discussion of systematic case briefing: INTRODUCTION TO THE STUDY OF LAW: CASES AND MATERIALS (W. Thode ed. 1970); LEGAL METHOD: CASES AND TEXT MATERIALS (H. Jones ed. 1980); W. STATSKY & J. WERNET, CASE ANALYSIS AND FUNDAMENTALS OF LEGAL WRITING (1977).

10. 328 U.S. 549 (1948).

11. 369 U.S. 186 (1962).

12. These nine cases are: Maryland Comm. for Fair Representation v. Tawes, 377 U.S. 656 (1964); Baker v. Carr, 369 U.S. 186 (1962); Colegrove v. Green, 328 U.S. 549 (1948); W.M.C.A. v. Simon, 196 F. Supp. 758 (S.D.N.Y. 1961); Magraw v. Donovan, 163 F. Supp. 184 (D. Minn. 1958); Dyer v. Abe, 138 F. Supp. 220 (D. Haw. 1956), *rev'd*, 256 F.2d 728 (9th Cir. 1958); Grills v. Anderson, 29 U.S.L.W. 2443 (Ind. 1961); Scholle v. Hare, 360 Mich. 1, 104 N.W.2d 63 (1960), *vacated*, 369 U.S. 429 (1962); Asbury Park Press v. Woolley, 33 N.J. 1, 161 A.2d 705 (1960).

TABLE 2. SYNTHESIZING A SET OF APPELLATE CASES

CRITERIA CASES	Equality Requirement W = 1 (or 2)	State/Federal Legislature W = 1	Disparity Significance W = 1	Federal/State Court W = 1	SUM (Weighted)	OUTCOME Winner	AWARD (Dollars)
Colegrove	1 (2)	1	1	2	5 (6)	D	0
Grills	2 (4)	2	1	1	6 (8)	A	2
Maryland	1 (2)	2	2	1	6 (7)	D	0
Scholle	1 (2)	2	2	1	6 (7)	D	0
WMCA	1 (2)	2	1	2	6 (7)	D	0
Asbury	2 (4)	2	2	1	7 (9)	A	6
Dyer	2 (4)	1	2	2	7 (9)	A	8
Baker	2 (4)	2	2	2	8(10)	A	9
Magraw	2 (4)	2	2	2	8(10)	A	10

NOTES:

1. In columns 1-4, 1 means "no" and 2 means "yes". An "A"in the outcome column means the attacker wins. A "D" means the defender wins.
2. The decision rule which the above data initially generates is:
   (1) If a redistricting case during the time period covered has a summation score of 7 or above, the attacker wins.
   (2) If a summation score is 6 or below, the defender wins.
3. This decision rule generates one inconsistent case, *Grills*. The inconsistency can be eliminated by the following possible changes:
   (1) Changing the *decision rule* such that a summation score of 6 provides an unclear outcome.
   (2) Giving the first variable a *weight* of 2, which would be consistent with the importance of requiring equality.
   (3) Adding a fifth *variable* called "Decided After the *Maryland* Case."
   (4) Eliminating the *Grills* case, which does not seem justifiable.
   (5) Changing the measurement on the first variable from no/yes to a 1-3 scale and give *Grills* a score of 3.
   (6) Finding that *Grills* really deserves a *relation* score of 2 on the third and fourth variables.
4. Each predicted criterion is initially given an equal weight of 1. If the equality requirement is then given a weight of 2, due to its substantive importance, the *Grills* case would no longer be an inconsistently low-scoring case which the attacker won. The new predictive decision rule would be:
   (1) If a redistricting case has a weighted summation score of 8 or above, the attacker wins.
   (2) If the weighted summation score is 7 or below, the attacker loses.
5. The dollar amounts in the last column represent hypothetical data showing how many thousands of dollars the successful attacker received in the form of damages. This information is useful for illustrating how the methodology predicts a continuum outcome as contrasted to a dichotomous outcome of winning versus losing.

answer on each of the four predictive criteria. The four criteria include: (1) whether equality in population among districts is explicitly required by the relevant federal or state constitution; (2) whether a state or federal legislature is involved in the redistricting; (3) whether the degree of disparity among districts is significant; and (4) whether a federal or state court is reviewing the redistricting.

The fifth column reveals the sum of the raw scores in each case. The sixth column in Table 2 indicates how each case was decided in terms of whether the party that prevailed in the litigation was the defender, D, or the attacker, A, of the existing redistricting system. The data available in Table 2 leads to a decisional rule in which the attacker of the redistricting system prevails when the total raw score is 7 or above. However, if the total raw score is 6 or below, then the defender of the system prevails in court. This decisional rule, however, is not necessarily consistent with the data in Table 2. For example, in *Grills v. Anderson,*[13] the total raw score was 6, but the attacker of the redistricting system still prevailed.

The notes following Table 2 reveal that inconsistencies, such as that found in the *Grills* score, can be eliminated by engaging in a variety of legitimate manuevers. The most meaningful approach to eliminating any inconsistencies is to give the predictive criteria different weights to indicate their relative importance. In this context, the most important criteria are the first criterion, concerning the nature of the law, and the third criterion, which deals with the key facts. Giving the equality requirement a weight of 2 will double all the numbers in the first column, which changes the summation scores (results indicated in parentheticals). The new weighted summation scores now lead to a decisional rule that states if the total raw score is eight or above, then the attacker of the redistricting system prevails; if the total raw score is seven or below, the defender prevails. This new decisional rule reveals no inconsistencies. The cases used as a model have thus been synthesized into a meaningful decisional rule.[14]

C. *Using MCDMS to Synthesize Facts in Trial Decisions*

An example of synthesizing a set of facts in a trial decision using the P/G% software is provided in Table 3. The facts utilized to generate the data in Table 3 are from a criminal case in which the primary

13. 29 U.S.L.W. 2443 (Ind. 1961).

14. *See generally* Nagel, *Using Microcomputers and P/G% to Predict Court Cases,* 18 AKRON L. REV. 541 (1985) (setting forth general backround material on applying multi-criteria decision-making to synthesizing sets of appellate cases).

TABLE 3. SYNTHESIZING TRIAL FACTS: A CRIMINAL CASE

CRITERIA / ALTERNATIVES	(1) Defense Statement (Alibi) W = 2	(2) Prosecution Statement (Scene of Crime) W = 1	(3) SUM (1)+(2)	(4) SUM / N (3)/2	(5) Weighted Sum (1.5)+(2)	(6) Weighted Sum / Sum of Weights (5)/3
Defendant is Guilty	.20 (.40)	.70	.90	.45	1.10	.37
Defendant is not Guilty	.80 (1.60) / 1.00 (2.00)	.30 / 1.00	1.10 / 2.00	.55 / 1.00	1.90 / 3.00	.63 / 1.00

NOTES:

1. The numbers in columns 1 and 2 are probabilities. They indicate the degree of accuracy or truth associated with the statements in the direction of establishing the defendant's guilt. Thus, the .20 probability means that there is a .80 probability that the defense statement is true, and the .20 complement is in the direction of establishing the defendant's guilt. These are probabilities of truth, not probabilities of guilt.
2. The weights indicate the degree of importance of the evidence items. Thus an alibi statement is quite important (if true) in establishing innocence. A statement saying the defendant was at the scene of the crime is less important because it does not necessarily establish the defendant's guilt. The numbers in parentheses in column 1 are weighted probabilities.
3. The numbers in column 3 are the sum of the two unweighted probabilities. The numbers in column 5 are the sums of the two weighted probabilities.
4. The numbers in column 4 are the average of the unweighted probabilities. The numbers in column 5 are the average of the weighted probabilities. The numbers in column 6 are an approximation of Bayesian conditional probabilities especially when one is only working with probabilities of truthfulness and degrees of importance.
5. If the probability in the upper right hand corner is greater than .90, then the judge, juror, or other perceiver of these two items of evidence should vote to convict assuming: (1) .90 is accepted as the threshold probability interpretation of beyond a reasonable doubt, and (2) these are the only items of evidence. Conversely, if the probability in the upper right hand corner is .90 or less, then one should vote to acquit.
6. If there are two alibi witnesses, each might receive a weight of 1.5. If there is one alibi witness a weight of 2 is received. They do not both receive a weight of 2 because they partly reinforce each other's testimony.
7. No set of weights will cause the weighted average to exceed .90 with probabilities of .20 and .70. Thus, there is no threshold value for either W1 or W2.
8. The difficulty of obtaining a set of evidence items that average better than a .90 probability may indicate that jurors and judges generally operate below the .90 threshold, even though judges and commentators say that .90 is roughly the probability translation of "beyond a reasonable doubt."

question to be answered is whether the prosecution will prove the defendant to be guilty beyond a reasonable doubt. For the sake of simplicity, there are only two items of evidence. The first item is a defense witness who offers an alibi for the defendant. There is an 80% probability that the alibi witness is telling the truth, which would obviously favor a not guilty verdict. The second item of evidence is a prosecution witness who claims to have seen the defendant at the scene of the crime. There is a 70% probability that the prosecution witness is telling the truth when that witness' testimony is analyzed without considering the testimony of other witnesses.

Not all witnesses or items of evidence have the same importance. For instance, in the context of the case analyzed in Table 3, an alibi witness is more important than a witness who saw the defendant at the scene of the crime. If the alibi witness is telling the truth, then the defendant cannot be guilty. If, however, the witness who allegedly saw the defendant at the scene of the crime is telling the truth, then the defendant could still be innocent of the crime charged, since presence at the scene of the crime does not necessarily imply that the defendant committed the crime. Therefore, the alibi statement has been given a weight of 2, as noted parenthetically in Table 3, column (1).

The synthesizing, then, involves adding .40 and .70 in order to obtain a weighted sum of 1.10 (see column (5)) for the alternative finding that the defendant is not guilty of the crime charged. Similarly, a weighted sum of 1.90 is found for the alternative that the defendant is not guilty. Those two weighted sums should then be divided by the sum of the weights, which equal three (two for alibi and one for prosecution witness). The quotient of this division yields .37 and .63 as shown in column (6). Hence, the synthesized data indicates that there is a .37 probability that the defendant is guilty and a .63 probability that the defendant is not guilty.[15] Since any criminal conviction must rest upon evidence that proves, beyond a reasonable doubt, that the defendant is guilty, it would be appropriate to acquit the defendant because the probability of guilt should be higher than .90.[16]

III. USING MCDMS TO PRESCRIBE DECISIONS IN LIGHT OF GOALS TO BE ACHIEVED

There are two types of prescriptive decisions that lend themselves to MCDMS analysis. The first type of decision is based upon policy.

15. The following materials set forth a general discussion of systematic synthesizing of facts in trial decisions: J. FRANK, COURT ON TRIAL: MYTH AND REALITY IN AMERICAN JUSTICE (1950); THE PSYCHOLOGY OF THE COURTROOM (N. Kerr & R. Bray ed. 1982); THE TRIAL PROCESS (B. Sales ed. 1981).

16. *In re* Winship, 397 U.S. 358 (1970).

Examples of decisions based upon policy would be the constitutionality of allowing illegally seized evidence to be admitted at trial, or perhaps, the constitutionality of a five-member jury. The second type of decision are those made at trial. For instance, trial decisions would include the decision to release a defendant on bail prior to trial, or the decision to acquit a defendant at the conclusion of the trial.

A. Policy Decisions

Table 4 provides an example of the use of P/G% software to analyze what policy should be adopted by the court in light of a set of goals to be achieved.[17] The subject analyzed in Table 4 is how illegally obtained evidence should be treated by the courts in criminal cases. There are four alternatives the court could adopt in such a situation. The court could admit the evidence under the good-faith exception to the exclusionary rule or the court could admit the evidence under the suspension-dismissal exception to the exclusionary rule. Further, the court could adopt the prevailing rule of excluding evidence seized contrary to the dictates of the fourth amendment of the United States Constitution.[18] Finally, the court could emphasize the possibility of a suit for damages by the criminal defendant against the offending police officer and the possibility of prosecution to deter illegal searches. The goals to be achieved include decreasing illegal searches, discouraging false testimony by police officers, and decreasing the crime rate.

The score of each alternative based upon the stated criteria is indicated in Table 4. The alternatives were scored on a 1–3 scale, where 3 represents a relatively high score, 2 is the equivalent of a middling score, and a 1 represents a relatively low score. When the goal of decreasing illegal police searches is considered, the alternatives of suspensions-dismissals and damages-prosecution are the strongest deterrents if applied. When the goal of deterring false statements by the police is considered, the good-faith exception to the exclusionary rule does not score as well as the other alternatives. Reviewing the goal of decreasing criminal occurrences, the good-faith exception scored the highest, probably because it allows law enforcement authorities the most freedom in conducting searches and seizing evidence. As to feasibility, the good-faith exception to the exclusionary rule may be constitutionally ques-

17. The following sources set forth a general discussion on analyzing some of the various legal policies adopted by the court system: LAW AND THE BEHAVIORAL SCIENCES (L. Friedman & S. Macaulay ed. 1977); S. NAGEL, POLICY EVALUATION: MAKING OPTIMUM DECISIONS (1982); S. NAGEL, RESEARCH ANNUALS IN LAW POLICY STUDIES (1986); R. POSNER, ECONOMIC ANALYSIS OF LAW (1977).

18. U.S. CONST. amend. IV.

TABLE 4. PRESCRIBING POLICY DECISIONS TO ACHIEVE GOALS: EVIDENCE ILLEGALLY OBTAINED

ALTERNATIVE POLICIES(X's)	GOALS TO BE ACHIEVED (Y's)				OVERALL SCORES							
	Decreasing Illegal police searches (L)	Not encouraging lying by police (N)	Decreasing crime occurrence (C)	Feasibility	Liberal Score		Neutral Score		Conservative Score		Total	
					B	A	B	A	B	A	B	A
1. Allow evidence in when police testify/illegal behavior was unintentional (Reagan)	1	1	3	1	8	11	10	13	12	15	30	39
2. Allow evidence in when the state rule is suspension on first offense and dismissal on second offense (Burger)	3	2	2	1	15	18	14	17	13	16	42	51
3. Exclude illegally seized evidence (Clark)	2	2	1	3	11	20	10	19	9	18	30	57
4. Emphasize damage suits deter illegal searches (Frankfurter)	3	2	2	1	15	18	14	17	13	16	42	51

NOTES:

1. Conservatives would give conservative goals a weight of 3, neutral goals a weight of 2, and liberal goals a weight of 1. Liberals would give conservative goals a weight of 1, neutral goals a weight of 2, and liberal goals a weight of 3. Neutrals would give all the goals a weight of 2.
2. The scoring of the alternatives on the goals is done on a 1-3 scale. A 3 means conducive to the goal. A 2 means neither conducive nor adverse to the goal. A 1 means adverse to the goal.
3. An overall score is calculated by summing the quantities of each relation score for a row multiplied by the weights as described in notes 1 and 2 above. For example, a liberal would give the weights of 3, 2, and 1 respectively to the relation scores in row 1. The overall score then equals: $((1x3) + (1x2) + (3x1)) = 3+2+3 = 8$.
4. The liberal, neutral, conservative, and total overall scores are shown before (B) and after (A) adding the feasibility criterion, which has been multiplied by the highest weight. Without the criterion, the exclusionary rule places third or fourth out of the four alternatives. *With the feasibility criterion, the exclusionary rule comes out first on all four value systems.* This assumes feasibility is worth a weight of 3 in view of its importance.
5. The other three alternatives are relatively lacking in feasibility because:
   (1) The good faith exception has questionable constitutionality, since it may provide too little deterence against illegal search and seizure.
   (2) A system of suspensions and dismissals would require approval by state legislators or police administrative boards. Neither source is likely to approve.
   (3) Prosecution of police officers for illegal searches without physical violence is unlikely. Likewise, the probabilities of an innocent or guilty person suing for damages, winning, and collecting the judgment are quite low.

tionable. The suspensions-dismissals alternative lacks legislative feasibility, and the damages-prosecution alternative lacks judicial feasibility.

If the scores are added across each alternative without giving different weights to the goals, the good-faith exception alternative scored a 6, whereas the scores of the other three alternatives were equal, with a score of 8. If different weights for the goals were given in order to consider the liberal, neutral, and conservative positions, there is still a three-way tie in scoring among the suspension-dismissal, the exclusionary rule, and the damages-prosecution alternatives. The conclusion to be drawn from Table 4 is that the exclusionary rule is the most practical of the tied alternatives because it is the only one that passes the feasibility constraint. The exclusionary rule is feasible because it has been widely adopted in the United States. The other three alternatives have not been widely adopted, and there is considerable doubt as to whether they ever could be.[19]

B. Trial Decisions

This section is devoted to a discussion of the decisions that should be reached in important trial matters, such as whether to hold or release a criminal defendant pending trial, or whether to acquit or convict a defendant who has been tried. Table 5 demonstrates how the P/G% software analyzes the important decision concerning whether to acquit or convict a criminal defendant. There are two obvious alternatives available to a finder of fact in a criminal case — a vote to acquit or a vote to convict. There are at least two essential goals in any criminal trial — to acquit the innocent, and to convict the guilty. Although additional goals are possible, they are not necessary for the example indicated in Table 5.

The materials in Table 5 assume that the decision-maker is faced with a criminal defendant who is perceived as having a .70 probability of guilt, and thus a .30 complementary probability of innocence. Table 5 also assumes that the goal of acquitting the innocent is considered to be ten times more important than the goal of convicting the guilty (weighted score).[20] Table 5 could utilize any set of probabilities or weights.

Given the probabilities chosen for the example in Table 5, voting to acquit has a .30 probability of achieving the goal of acquitting the

19. *See* United States v. Calandra, 414 U.S. 338 (1974); Mapp v. Ohio, 367 U.S. 643 (1961).

20. 4 W. BLACKSTONE, COMMENTARIES 358 (1765).

TABLE 5. PRESCRIBING TRIAL DECISIONS TO ACHIEVE GOALS

CRITERIA	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	PERCEIVED VALUES					THRESHOLD VALUES	
	Acquitting the Innocent w = 10		Convicting the Guilty w = 1		WEIGHTED TOTAL	Acquitting the Innocent	Convicting the Guilty
ALTERNATIVES	Score	Wtd. Score 10 times (1)	Score	Wtd. Score 1 times (3)	(2) + (4)	W = 2.33	W = 1
VOTE TO CONVICT	0	0	.70	.70	.70	0	.91
VOTE TO ACQUIT	.30	3.00	0	0	3.00	.09	0

NOTES:

1. Acquitting the innocent is tentatively considered to be 10 times as important as convicting the guilty in accordance with the value system of William Blackstone.
2. The above situation is for a hypothetical case in which the defendant is perceived as having a .70 probability of guilt. Guilt could also be measured on a 0-10, 1-5, or scale other than 0-100.
3. A vote to convict is considered as having no effect on acquitting the innocent, and a vote to acquit has no effect on convicting the guilty. For a different approach, one could consider voting to convict as having a -.30 effect on acquitting the innocent, and voting to acquit as having a -.70 effect on convicting the guilty in this case. Either approach produces identical results. The approach shown in Table 5 is, however, the simpler approach.
4. The threshold weight of 2.33 indicates how low the weight of Goal 1 to Goal 2 would have to be in order to have a tie when the probability of guilt is .70.
5. The threshold probability of .09 and .91 are the probabilities that will result in a tie between the two alternatives when Goal 1 is considered 10 times as important as Goal 2.
6. The threshold values are calculated by using the formula $W(1-P) = P$, where W is the weight of Goal 1 to Goal 2, and P is the probability of guilt.

innocent. On the other hand, a decision to convict the criminal defendant has a .70 probability of realizing the goal of convicting the guilty. Voting to convict has either zero effect on the desired goal of acquitting the innocent or a -.30 effect. Similarly, a decision to acquit has either no effect on convicting the guilty or a -.70 effect. Either interpretation, however, leads to the same result.

Column (2) of Table 5 indicates that the scores in column (1) have been multiplied by a weight of 10. Column (4) demonstrates that the scores in column (3) have been multiplied by a weight of 1. Those weights or multipliers reflect the 10 to 1 trade-off of the two goals. When the weighted scores are summed across each alternative, the vote to convict alternative has a weighted total of .70, and the vote to acquit alternative has a weighted total of 3. Thus, given the facts presumed in Table 5, the decision-maker should vote to acquit the defendant in the hypothetical case, given the probabilities of guilt, the probabilities of innocence and the relative weights of the two goals.

The threshold values for each probability and each weight are of special interest. The threshold values are the values that either the original scores or the original weights would need to be in order for the second-place alternative to have a score greater than or equal to the first place alternative. If the probabilities of guilt and innocence were changed to .91 and .09 respectively, and the weights of each probability were kept at 1 and 10 respectively, the resulting weighted totals would each equal .9 when rounded off to one decimal place. Thus, .91 is a threshold or tie-causing value with weights of 1 and 10. On the other hand, if the probability of guilt or innocence were maintained at .70 and .30 respectively, and the weights of each probability were 1 and 2.33 respectively, the weighted total for each alternative would equal .70 when rounded up to one decimal place. Thus, a weight of 2.33 for avoiding conviction errors is a threshold or tie-causing value with probabilities of .70 and .30.

These threshold values can be determined by solving the breakeven equation $W(1-P) = P$ for the desired variable, which is weight (W) or percentage (P). For example, inserting the guilty percentage of .70 for P and solving the equation for the unknown variable W, yields a W threshold value of 2.33, which is the tie-causing weight. Similarly, inserting the innocent weight value of 10 for W and solving the equation for P, yields a P threshold value of .91. When the compliment of .91, which is .09, is then inserted for the corresponding percentage, the weighted totals will be equal when each of these new percentages is multiplied by the original guilty and innocent weights of 1 and 10 respectively. Thus, if any value between 0 and 1 is inserted, the threshold weight equation can be solved. Similarly, if any value is inserted for W,

the equation can be solved.[21]

IV. JUDICIAL ADMINISTRATION

There are many examples that can be utilized in demonstrating the use of systems analysis to improve judicial administration. Three instructive examples are the assigning of judges to particular types of cases, the efficient sequencing of court cases, and the allocation of cases to alternative methods of dispute resolution.

A. Assigning Judges to Cases

Table 6 demonstrates a systematic approach for assigning judges to various types of cases. The hypothetical problem utilized in Table 6 involves two judges, Judge Fox and Judge Wolf. The two types of cases to be assigned are criminal and civil cases. Further, each judge in the hypothetical situation is expected to spend an average of ten hours a week on the bench. In any given week, there are approximately eight hours of criminal trial time and twelve hours of civil trial time necessary to keep the court's docket up to date.

Judge Fox received a quality score of 4 for criminal trial cases on a 1–5 scale, and Judge Wolf was given a quality score of 2 for criminal trials. Each judge was assigned a quality score of 3 for civil trials. The scores were provided by having each judge or lawyer in the system anonymously score each other, which presumes there are more than two judges available in this jurisdiction. Further, each judge also scored himself on the category pertaining to his degree of interest in the case types. The ability and interest scores were averaged to produce the aforementioned quality scores. The next inquiry, then, is to determine the most appropriate allocation of Judges Fox and Wolf to the two types of cases.

The most appropriate allocation, in this context, is an assignment that would result in as high an overall score in quality as possible within the row and column constraints. The overall quality score is the summation of the products calculated by multiplying each judge's quality score times the hours assigned for a given case type. In this context, the equation for the overall quality score is $4a+2c+3b+3d$. The object is to solve for variables a, b, c, and so as to maximize the overall score and to satisfy the stated constraints.

The most appropriate method of proceeding if the attorney does

21. For literature on prescribing trial decisions or decision-making processes in light of the goals to be achieved, see K. BOTTOMLY, DECISIONS IN THE PENAL PROCESS (1973); M. GOTTFREDSON & D. GOTTFREDSON, DECISIONMAKING IN CRIMINAL JUSTICE: TOWARD THE RATIONAL EXERCISE OF DISCRETION (1980); S. NAGEL & M. NEEF, DECISION THEORY AND THE LEGAL PROCESS (1979).

TABLE 6. ASSIGNING JUDGES TO CASETYPES

CASES	CRIMINAL		CIVIL		
JUDGE	Quality Score	Hours Assigned	Quality Score	Hours Assigned	Hours per Judge
FOX	4	a	3	b	10
WOLF	2	c	3	d	10
Hours per Casetype		8		12	20

NOTES:

1. The allocation system is shown in its simplest form with two judges and two case-types. Each judge is expected to put in ten hours a week to satisfy the average weekly total of 20 hours of trial time. Criminal cases constitute 40% of the total, or 8 hours, and civil cases constitute 60% of the total, or 12 hours. Judge 1 receives scores of 4 and 3 on the two case-types, and Judge 2 receives scores of 2 and 3.
2. A logical way to resolve the optimum allocation with this relatively simple example is to reason as follows:
   (1) Judge Wolf does a bad job on criminal cases. Therefore, give Judge Wolf 0 criminal hours. That means Judge Wolf gets 10 civil hours to add across to 10. Judge Fox must then get 8 criminal hours to add down to 8. Judge Fox must also get 2 civil hours in order to add across to 10 and down to 12.
   (2) Judge Fox does a good job on criminal cases. Therefore, give Judge Fox as many hours as possible on criminal cases, which is 8. That means Judge Wolf gets 0 criminal hours to add down to 8. Judge Wolf must then get 10 civil hours to add across to 10. Judge Fox must also get 2 civil hours to add across to 10 and down to 12.
3. On a more general level, resolve the optimum allocation by reasoning as follows:
   (1) Pick out all the quality scores that are 1's or 2's. Give those cells as few hours as possible.
   (2) Pick out all the quality scores that are 5's or 4's. Give those cells as many hours as possible.
   (3) Make logical adjustments so that all the columns add down to fulfill the hours required per case-type, and all the rows add across to fulfill the required hours per judge.
   (4) Also try to minimize the number of case-types per judge, rather than have every judge handle every case-type
4. The optimum allocation is defined as allocating the total number of hours to each cell so as to satisfy the row constraints, the column constraints, and any cell constraints, while at the same time maximizing the sum of the products of the quality score multiplied by the hours assigned for each cell. A cell includes a quality score of a judge on a case-type and a quantity of hours assigned to a judge on a case-type.

not have a computer is to assign as few hours as possible to those cells which have quality scores of 1 or 2. Conversely, as many hours as possible should be assigned to those cells that have quality scores of 4 or 5,. while satisfying the constraints. In so doing, there is resulting allocation of 0 hours to c, 8 hours to a, 2 hours to b, and 10 hours to d in the example.

The method of allocation described above can be meaningful when applied to both a substantial number of judges and cases. However, assignment problems involving a large number of judges and types of cases can be solved faster and with more efficiency by using a linear programming routine. The use of such a routine on a microcomputer is quite simple. The only information required to be input into the computer are the row totals, the column totals, and the quality scores. The computer then generates the optimum allocations. The program will also indicate how much each quality score can vary without affecting the optimum result, how much each row and column total can vary, and how much of a change in the overall quality score would occur as a result of a change in the other data.[22]

B. Sequencing of Court Cases

Table 7 indicates that substantial time savings per case can be achieved by hearing the case that is anticipated to take the least amount of the court's time first and hearing the case that is anticipated to take the greatest amount of the court's time last. The cases utilized in Table 7 are predicted to take 20, 10, and 5 days of trial time, respectively.

If the cases are heard in the order shown in row 2, several scenarios would result. There will be no delay for the first case, which, of course, is true for all first cases on the court's docket. The second case would be delayed by twenty days while waiting for the first case to be completed. Finally, the third case could be faced with a thirty day delay before going to trial because the first two trials took a total of thirty

22. For materials discussing the assignment of judges to case-types, see ABA COMMISSION ON STANDARDS OF JUDICIAL ADMINISTRATION, AMERICAN BAR ASSOCIATION, STANDARDS RELATING TO TRIAL COURTS 86–93 (1976); TASK FORCE ON THE ADMINISTRATION OF JUSTICE, PRESIDENT'S COMMISSION ON LAW ENFORCEMENT AND ADMINISTRATION OF JUSTICE, THE COURTS 88–90, 165–67 (1967). For general literature on assigning people to tasks, see W. ERIKSON & O. HALL, COMPUTER MODELS FOR MANAGEMENT SCIENCE (1983). For information on assigning lawyers to case-types, see Nagel & Mills, *Using Management Science to Assign Lawyers to Types of Cases*, 15 CAP. U.L. REV. 223 (1986).

TABLE 7. SEQUENCING COURT CASES: THE TIME CRITERIA

CRITERIA ALTERNATIVE SEQUENCES	(1) Waiting Time for 1st Case	(2) Waiting Time for 2nd Case	(3) Waiting Time for 3rd Case	(4) Total Processing Time	(5) Total Time (1+2+3+4)	(6) Average Total Time (5)/3
1) 20, 10, 5	0	20	30	35	85	28
2) 20, 5, 10	0	20	25	35	80	27
3) 10, 20, 5	0	10	30	35	75	25
4) 5, 20, 10	0	5	25	35	65	22
5) 10, 5, 20	0	10	15	35	60	20
6) 5, 10, 20	0	5	15	35	55	18
Totals	0	70	140	210	420	140
Average/6	0	12	23	35	70	23

1. There are three cases. They are predicted to consume in trial 20 days, 10 days, and 5 days respectively. The problem is determining the optimum order in which to sequence the cases. There are six possible orders or sequence patterns for the three cases. For the sake of simplicity the analysis assumes only one judge or one processor.
2. The waiting time for any case is the sum of the processing times or trial times of the prior cases. The total processing time is always the sum of the separate trial times regardless of the order in which the cases occur. The overall total time is the sum of the waiting times and the processing times.
3. Taking the shortest cases first minimizes the average total time. Taking the longest cases first maximizes the average total time.

TABLE 7B. SEQUENCING COURT CASES: THE EQUITY CRITERIA

CRITERIA / ALTERNATIVE SEQUENCES	(7) Sum of Gains	(8) Sum of Losses	(9) Net Gains	(10) Maximum Waiting Time	(11) Maximum Total Time
1) 20, 10, 5	0	0	0	30	35
2) 20, 5, 10	10	-5	5	25	35
3) 10, 20, 5	20	-10	10	30	35
4) 5, 20, 10	30	-10	20	25	35
5) 10, 5, 20	40	-15	25	15	35
6) 5, 10, 20	45	-15	30	15	35
Totals	145	-55	90	104	210
Average/6	24	-9	15	23	35

NOTES:

4. Equity is generally considered a constraint that is either fulfilled or not fulfilled. This is unlike the average total time which is a variable goal to be minimized.
5. The utilitarian measure of equity is whether the greatest good for the greatest number has been promoted. That means whether the sum of the gains outweighs the sum of the losses. This test is fulfilled by improving the situation when the longest cases are first. The most improvement is realized when the shortest cases are first.
6. The Pareto measure of equity is whether those who have losses could be compensated by those who have gains. This test is fulfilled here since the losers could be compensated for their losses, and the gainers would still come out ahead. This is especially so if one considers that the losers are the longer cases that are making extra use of tax-supported facilities.
7. The Rawlsian measure of equity is that no case should suffer more than a maximum waiting time. If the maximum waiting time is 60 days, then the equity criterion is fulfilled. Notice that with alternative 6, the average time per case is substantially reduced as well as the maximum waiting time. Thus, this alternative gives both increased efficiency and increased equity.

days. The total processing time or trial time for all three of the hypothetical cases is thirty-five days, which is obviously the sum of their separate trial times. If fifty days waiting time is added (column (2) plus column (3)) to the thirty-five days processing time (column (4)), there is a total time across the three cases of eighty-five days. Therefore, an average of twenty-eight days per case results.

If the cases are heard such that the shortest cases are heard first (indicated in row 6), there will be a resulting five day waiting time for the second case and only a fifteen day delay for the third case. Therefore, only twenty days of waiting time is added to the thirty-five day processing time, which results in an overall time total of fifty-five days. If the fifty-five days is divided by the three hypothetical cases, an average of eighteen days per case results. A time savings of ten days per case is achieved by switching the cases on the docket so that the shortest case is heard first.

The fairness or equity of such a scheduling system might be questioned. Table 7B indicates how much time each case has gained or lost as a result of altering the docketing system. The table shows the total days gained (column (7)) or the total days lost (column (8)) as a result of rearranging the sequence of cases as initially set out in alternative 1. The net gains are then figured (column (9)) by adding the values in columns (7) and (8).

In row 6, for example, the sum of gains obtained by switching from alternative 1 to alternative 6 is forty-five days. Those forty-five days reflect the fact that the case expected to take five days has gained thirty-days (compare Table 7 - row 1, column (3) with row 6, column (1)), and the case expected to last for ten days has gained fifteen days. The data available in row 6 also indicates that the case scheduled for twenty days has lost fifteen days by being scheduled after the first two cases. The net gain of thirty days (45-15) demonstrates that the system does satisfy the utilitarian criterion of fairness by promoting the greatest gain in days for the greatest number of cases.

It is important in discussing the equity of optimum sequencing to consider that the cases which gained time could compensate the cases which lost time. If alternative 1 and alternative 6 are used as an example, analysis of Table 7B indicates how monetary compensation could be afforded the case that was forced to lose time, if one day lost is worth one monetary unit. Assuming, for example, the five day case and ten day case, which gained 45 days together could collectively give the 20 days case, which lost 15 days, fifteen monetary units for the lost days. This compensation, however, would still be thirty monetary units ahead between the two cases that gained time. Consequently, the case that lost time would be compensated and the two cases that gained

time would not suffer any negative impact due to their contribution.

It has been proposed that such compensation could be accomplished through differential filing fees. Such a system, however, would seem to be unnecessary because the case that lost time has been compensated by having control over the courtroom for a greater period of time at the taxpayer's expense. More importantly, the system of sequencing could specify that no case would be required to wait for more than thirty or sixty days. If a case is approaching the maximum period of delay time, it could then be resequenced and moved to the top of the court's docket. The cases could also be grouped for docketing every one or two weeks so that the longest case in any time period would go ahead of the shortest case in the subsequent time period.[23]

It must be noted that all the alternative sequences are equal in terms of the cost of judges and court personnel, in permitting each set of litigants access to the courtroom, and in preventing the need to reduce the trial time for any case. It has also been found helpful to predict trial time from knowledge of the subject matter of the cases. Optimum sequencing, moreover, is politically feasible because there does not appear to be any constitutional problems or cost prohibitive consequences of the process.

C. *Allocating Cases to Alternative Methods of Dispute Resolution*

Table 8A demonstrates how the P/G% software can be useful in an allocation-type problem in which the bottom line consists of allocation percentages. The hypothetical problem utilized here concerns allocating criminal cases to alternative methods of resolving them.

The two alternatives available in the hypothetical cases are trials and plea bargains. Additional alternatives, such as diversion programs and dismissals, could also be considered. The goals utilized in the problem consist of a desire to reduce delay in the resolution of cases and a desire to promote respect for the legal system. Additional goals, such as reducing expenses and increasing the probability that innocent persons are acquitted, could also be factored into the problem.

The raw data in Table 8A hypothetically indicates that the average length of time between arrest and completion of the criminal trial

23. For materials discussing efficient docketing and sequencing of court cases, see M. SOLOMON, CASEFLOW MANAGEMENT IN THE TRIAL COURT (1973); Nagel, Beeman & Reed, *Optimum Sequencing of Court Cases to Reduce Delay*, ALA. L. REV. 583 (1986). For more general literature on efficient sequencing, see R. CONWAY, THEORY OF SCHEDULING (1967).

TABLE 8. ALLOCATING CASES TO METHODS OF RESOLVING: THE BASIC DATA

A. RAW DATA

	Delay (Days)	Respect (0-10 Scale)
Trials	120	6
Pleas	30	2
	150	8

B. TRANSFORMED RAW DATA

	Speed (1/Days)	Respect (-5 to +5)
Trials	1/120 or .00833	+1
Pleas	1/30 or .03333	-3
	5/120 or .04166	-2

C. PART/WHOLE PERCENTAGES

	Speed P/W%	Respect P/W	Aggregate P/W%	Allocation %
Trials	20%	100%	120%	60%
Pleas	80%	0%	80%	40%
	100%	100%	200%	100%

D. WEIGHTED P/W%'s

	Speed w=1	Respect w=2	Aggregate P/W%	Allocation %
Trials	20%	200%	220%	73%
Pleas	80%	0%	80%	27%
Total	100%	200%	300%	100%

NOTES:

1. The raw data is hypothetical, but realistic. The object is to decide on the optimum allocation of cases suited for trials and cases suited for pleas in light of the facts that:
   (1) Trials receive a 120 day delay score and pleas receive a 30 day delay score.
   (2) Trials receive a score of 6 on the respect scale and pleas receive a score of 2 on the same scale.

2. Transforming the raw data involves:
   (1) Calculate the reciprocals for the raw scores of the negative goal of delay.
   (2) Re-calculate the raw scores on respect using a scale which shows absolute zero. If N equals absolute zero, then subtract N from each of the original raw scores. For example, on a 0-10 scale, the number 5 (or below) might be absolute zero.

3. Calculating the correct part/whole percentages involves:
   (1) Calculate the part/whole percentages on the inverted negative goal of delay.
   (2) Give zero percent to any alternative that has a negative raw score. Then calculate the part/whole percentages for the other alternatives.

4. Calculating the allocation percentages involves:
   (1) Multiply the part/whole percentages in each column by the relative weight given to the column.
   (2) Sum the weighted part/whole percentages across each alternative.
   (3) Divide those aggregate percentages by the sum of the weights. The results are the allocation percentages for each alternative or budget category.

is 120 days, while the average plea bargain takes 30 days from date of arrest to final disposition. The data also shows that the alternative of proceeding to trial receives a respect score of 6 on a 0–10 scale in a rough survey of attorneys. In addition, the alternative of plea bargaining receives a survey score of 2.

Since the delay and respect values are in different units, days and numerical scale, a common measure is needed in order to be in a position to add the two scores. In order to alleviate this problem, several things must be done.

The delay scores must be converted into part/whole percentages. The first step in this process is to calculate the reciprocals of each delay score. Thus, for trial delay, the reciprocal of 120 would equal 1/120, which has the decimal equivalent of .00833. This number is then divided by the sum of the delay (.00833/.04166). The quotient of this calculation is the part/whole percentage for trial delay which, in this example, equals 20%. These same calculations would next be run for the plea delay. Inverting the scores representing the negative goal of delay enables the trial score to remain four times as long, or as bad, as the plea score, while simultaneously making the plea score numerically higher than the trial score. Consequently, the resulting part/whole percentages can thus be viewed in terms of speed, rather than delay.

The respect scores must now be converted into part/whole percentages. First, the scores in the respect category must be adjusted to indicate where they would be located on a scale reflecting absolute zero for the given range of numbers. For example, on a scale from 1 to 10, absolute zero would be 5. In other words, the middle number on the scale becomes zero and the other numbers on the scale adjust accordingly. Therefore, in our example, 1 would equal negative 5, 5 would equal zero, and 10 would equal positive 5. The respect scores are set to the absolute zero scale by subtracting the absolute zero number from the original score. In this example, 6 becomes +1 and 2 becomes -2. The transferred raw scores must now be converted into part/whole percentages. Only the minimum possible percentage should be attributed to the alternative with a negative score; pleas would be given a part/whole percentage of 0%. The trials percentage then must be made to equal 100%, since the sum of percentages must equal 100%.

Once the part/whole percentages are calculated, the aggregate part/whole percentages may be calculated by summing the speed and respect scores laterally for each alternative, trials and pleas. The aggregate part/whole percentages are then divided by two, since greater than 100% cannot be allocated. The resulting quotient is labeled the allocation percentage. Hence, the analysis indicates that given the delay and respect values as listed in Table 8A, 60% of criminal cases

should be resolved by plea bargains.

The above analysis can be taken one step further. As shown in Table 8D, the speed and respect factors may be weighted with respect to their perceived importance. Table 8D takes into consideration that the goal of increasing respect for the judicial system is considered to be twice as important as the goal of reducing delays in dispensing with cases. Therefore, the percentages in the respect column must be multiplied by 2. The new aggregate percentages are 220% and 80%. The percentage is then divided by 3, which is the sum of the weights. Consequently, when respect is weighted two times as important as speed, 73% of the criminal cases would be resolved by trials and 27% of criminal cases would be resolved by plea bargain.

Not all allocation problems involve multiple dimensions, negative goals, or negative scores. If, however, one can follow the allocation analysis in Table 8, then simpler allocation situations will not be problematic.[24]

IV. COMPUTER-AIDED MEDIATION

Adjudication seeks to determine which party has the strongest legal position between the plaintiff and the defendant. By necessity, then, there must be a "winner" and a "loser" in adjudications. Mediation, on the other hand, seeks to resolve the dispute by means of a settlement in which both parties feel they have won, at least in the sense of coming out of the dispute in a better position than they might have expected if the case had gone to trial, or some other non-settlement means of dispute resolution.

Mediation can be aided by computers, especially with spreadsheet software. This software permits each side in the dispute to compare more systematically the benefits and costs of settling the dispute, as opposed to proceeding to trial or resorting to another non-settlement approach.[25]

V. CONCLUSION

Multi-criteria decision-making models offer a wide variety of benefits to the judicial process. The models encourage those involved in judicial decision-making to be more explicit in defining the goals to be achieved by a particular decision, the alternatives for achieving the goals, and the relationships between the goals and the alternatives. The

24. For information on allocating cases, money, or other resources to activities or places, see S. Nagel, EVALUATION ANALYSIS WITH MICROCOMPUTERS (1989).

25. For further details on computer-aided dispute resolution, see S. NAGEL, MULTI-CRITERIA METHODS IN DISPUTE RESOLUTION (1990); S. Nagel, *Microcomputers, Dispute Resolution, and Values*, OHIO ST. J. ON DISPUTE RESOLUTION (1987).

models also assist decision-makers in choosing the alternative, or combination of alternatives, that is most beneficial. Further, MCDMS models can lead to more predictive decisional rules and thus help to eliminate inconsistent precedents.

But perhaps most important, in terms of forming judicial decisions, the models encourage the users to inject their knowledge and expertise into the problem. In addition, the models stimulate new insights into causal and normative relations that might otherwise be overlooked by the decision-maker. Finally, MCDMS models can be used by the average practitioner in order to simplify arithmetic, record-keeping, and manipulation of data.

There are few costs involved in obtaining the benefits available from MCDMS. A user need only have a willingness to think differently and more explicitly about the judicial process. The benefits of using the models clearly outweigh the costs, particularly if the models are used as supplements, rather than substitutes, to traditional perspectives.[26]

26. The ideas from this article are currently being presented or scheduled for presentation at special judicial training seminars sponsored by the Committee for Continuing Professional Education of the American Law Institute and the American Bar Association, the ABA Committee on Appellate Staff Attorneys, and possibly the ABA Judicial Administration Division, the National Judicial College, and the National Center for State Courts.