Designing an Effective Problem Solving Organization With The MAPS Design Technology

Ralph H. Kilmann, *University of Pittsburgh*
Marjorie A. Lyles, *University of Pittsburgh*
Ian I. Mitroff, *University of Pittsburgh*

Because of increasingly dynamic and changing environments there is a greater need to create particular problem-solving designs so that frequently emerging problems can be defined and addressed. The MAPS Design Technology is a systematic set of methodologies to actually create problem-solving designs distinct from the organization's operational design. It is argued that the latter design is best for guiding specific, day-to-day activities while the problem-solving design is needed for the ill-defined, long-term concerns of the organization. Without a technology such as MAPS, the organization is expected to have a fairly difficult time in trying to create and decide on something as important and complex as organization design by simply intuitive processes.

INTRODUCTION

Today's organizations are facing increasingly dynamic and changing environments which pose more complex and ill-defined problems than organizations have previously had to address. These problems include: which new international markets to explore, which new technologies should and can be developed, whether organizational goals should be altered, how employees should be effectively motivated, what social responsibility policies the organization should formulate and implement. But these problems involve the entire organization, not just one or two departments or divisions, and these problems can never be completely resolved since they are always present. Thus, these problems must be continually managed. Furthermore, the information needed to analyze these problems is not generally available nor will the information ever be complete — because the nature of the problem keeps changing. In fact, one might argue that the basic problem is defining what the problem is; then one can begin seeking information, analyzing the problem, and deriving and implementing strategies to manage the problem. [6]

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Organizations, however, are designed more to perform day-to-day activities and to efficiently produce well-defined products and services — not to solve complex and changing problems. In particular, organizations are designed into operational sub-units (e.g., production, marketing, finance, etc.) to explicitly pursue well-defined goals and tasks. But how can the organization engage in effective problem solving if it is primarily designed for day-to-day concerns and if complex problems simply do not fit well into the design categories or boxes on the organization's chart? What is needed is a new approach to organizational problem solving — one that involves the entire organization or those that are directly affected by complex problems, and one that specifically **designs** for problem solving by mobilizing resources (i.e., people, goals, tasks, information, etc.) in a manner that does not confine the organization to addressing problems within the given day-to-day operational design.

This paper presents the MAPS Design Technology as a new approach to organizational problem solving and summarizes some of the major aspects of this technology and how it is appropriate to creating problem-solving as well as operational designs. In essence, this paper attempts to provide not only theoretical frameworks for highlighting the key issues regarding formal problem-solving designs, but suggests how the MAPS Design Technology can actually be used to **create** such designs in an organizational setting.

THE MAPS DESIGN TECHNOLOGY

MAPS, which stands for **M**ultivariate **A**nalysis, **P**articipation, and **S**tructure, was intially suggested by Kilmann and McKelvey [5] to re-design the sub-units of organizations and was then developed into a formal design technology by Kilmann. [2;3] Essentially, using questionnaire data on members' task and/or people preferences, MAPS can group tasks into task clusters, people into people clusters, and can then assign each people cluster to a task cluster resulting in alternative organization designs. MAPS is intended for a wide variety of design objectives. [7] In essence, MAPS is meant to be applicable whenever the issue emerges of how to best mobilize human and technological resources to address organizational objectives and problems.

The MAPS Design Technology consists formally of as many as 12 distinct steps starting from the identification of an organization problem that can be defined vis a vis organization design, to the evaluation of whether a new implemented design actually improved organizational effectiveness (i.e. that the design change actually solved or managed the initial problem). Specifically, the steps include:
 (1) Entering and diagnosing the organization
 (2) Conceptualizing the design problem and determining the boundaries of the analysis (e.g., who is to be included, which departments, divisions, etc.)
 (3) Specifying the design objectives (e.g., designing for operational purposes, for strategic planning, etc.)
 (4) Choosing one of the scientific models of MAPS (i.e. different combinations of input variables, computer analyses, and output formats in

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relation to design objectives or conceptual models of the problem)

(5) Developing the task and/or people items for the MAPS questionnaire (i.e. tasks to accomplish, people to work with on the tasks)

(6) Responding to the MAPS questionnaire (e.g., the extent to which each respondent would like to work on each task, and to work with each other respondent)

(7) Analyzing the design data from Step 6 via the MAPS Computer Program (i.e., using multivariate statistics to generate alternative organization designs by showing which groups of people should work on which clusters of tasks)

(8) Selecting a MAPS design (i.e. choosing one of the several designs that can be generated in Step 7 via a dialectic debate)

(9) Implementing the selected design (i.e., providing resources, authority, policies, responsibility, etc. for members to actually work in new design team building and support to help them learn to work effectively in new design)

(10) Monitoring the implementation process (e.g., assessing resistances to change, emerging problems, etc., and then utilizing strategies to best manage the process)

(11) Evaluating the results of the design change (i.e., does the new design solve or manage the initial problem? — does the new design improve organizational effectiveness?)

(12) Rediagnosing the organization (i.e., reinstating the diagnostic process in Step 1)

Central or core to the MAPS Design Technology are steps 5, 6, and 7 — the input, analysis and output of the computerized design process. This core is what makes MAPS concrete and operational, and around which the prior and later steps have been developed. Without this core, MAPS would be strictly a qualitative or "soft" technology and therefore would not have the advantages of precise quantitative formulations. But it is important to point out that the core of MAPS, while being the concrete and computerizied aspect of the technology, is in a broader sense the smallest aspect of the whole technology. In particular, the steps of the technology prior to the core are primarily diagnostic and educational while the steps following the core are primarily concerned with implementation. The basic reasons why the prior and latter steps are so important relative to the core (even though the former are qualitative) is that the prior steps determine the validity of the data gathered in the core, and the steps following the core determine whether the potential of the MAPS output will actually be manifested.

The Core of MAPS

The input to the MAPS analysis entails two aspects: the development of the task items for the MAPS questionnaire, and the appropriate members responding to both the task and people portions of the questionnaire. Regarding the creation of a special purpose problem-solving design, members throughout the organization (or their representatives) would develop a list of items reflecting the types of problems that these members are currently experiencing or expect to be experiencing in the organization.

Specifically, for purpose of illustration, consider an organization of 1000 members distributed into 10 sub-units which are primarily oriented to

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day-to-day activities and specific products and services. The first step in the MAPS process (assuming that the organization is sincerely interested in and committed to this design process) is for representatives in each sub-unit, say 10 individuals in each, to generate a list of key problems that each feels is pertinent to his sub-unit or the entire organization. These 100 representatives may generate as many as 1000 problem items, but the total list can generally be reduced to less than 100 items by eliminating redundancies. The final list of say 75 items thus represents the key problems experienced and perceived by the total organization.

The next step is to formulate the MAPS questionnaire and to ask representatives from each sub-unit to respond to the questionnaire (not necessarily the same representatives as in the first step). Those responding to the questionnaire will be those who will actually become involved in the problem-solving design. Specifically, the questionnaire is formulated into two parts. The first part lists the 75 or so problem items that were generated in the first step and asks each respondent to indicate on a seven-point scale (from "not at all" to "extremely") how much he feels he would like to work on each problem item and the extent to which he feels he has the expertise to address each problem listed. The second part of the MAPS questionnaire lists all the people responding to the questionnaire (i.e., those that will be involved in the problem-solving design) and asks each respondent to indicate on a seven-point scale (same as Part 1) to what extent the respondent can work well with each individual listed, and to what extent each individual has the expertise needed to work with him on organizational problems. The respondent also has the opportunity to indicate if he "does not know" one or more listed individuals, which is quite possible if the respondents come from different sub-units in the organization. However, the responses to Part 2 at least collect what information is available and known about how well the respondents can work with one another.

The analysis performed by the MAPS Computer Program groups respondents to the MAPS questionnaire into people clusters representing sub-units of organization members (or problem-solving groups). These people clusters, however, can be formed by different input data. Specifically, people clusters can result from strictly task items in that respondents tend to be placed in the same cluster if they have similar perceptions as to the tasks they wish to address. Alternatively, people clusters can result strictly from people items where respondents are grouped together if they have similar perceptions of with whom they can best interact. And thirdly, people clusters can be formed by combining or integrating perceptions of tasks and people. This latter analysis thus groups respondents together if they have similar perceptions regarding the task and people in the organization. Shortly, we will be considering the implications of these different inputs and analyses, and how these define different genotypic designs.

The analysis performed by the MAPS Computer Program is also capable of forming task clusters for the organization which represents a focus of activities, objectives, issues, etc., for the people clusters (i.e., each people cluster can be assigned a task cluster for each design solution). Unlike the formation of people clusters, however, only task items are utilized to develop task clusters. In other words, task items tend to be grouped together if respondents (as a whole) see them as belonging together (specifically, as correlating highly with one another). However, there are basically two

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different kinds of task items that can be generated and utilized. One type of task item is strictly operational activities, i.e., specific tasks that need to be performed in order to accomplish operational, short-term objectives. The other type of task item is the specification of **problems** and strategic issues, e.g., why there might be gaps between objectives and performance. The choice to the organization is whether to develop a list of task items for the MAPS questionnaire which specify operational activities or a list of task items which attempt to define problems and/or strategic issues.

The output of the MAPS analysis consists of showing people clusters (the names of people in each group), task clusters, and the assignment of task clusters to people clusters. In other words, each people cluster that is formed by a MAPS analysis is assigned a task cluster — that which the people cluster is expected to address. This assignment process is too involved to detail here, but basically the assignments are made as much as possible so that each people cluster is given the task cluster it most strongly endorsed, as based on statistical calculations from responses to the MAPS questionnaire. Furthermore, since the multivariate procedures of the MAPS analysis permit several alternative solutions from the same data source, the output of MAPS shows these varied solutions. Basically, the respondents to the MAPS questionnaire can be clustered into 2 groups, 3 groups, etc., until certain statistical limits are reached. [1] Similarly, the task items can be clustered into 2 task clusters, 3, etc. The resulting designs or output is therefore two people clusters assigned to two task clusters, three people clusters assigned to three task clusters, etc. Each of these solutions is a different way of decomposing the members and tasks of the organization into a different design, while each solution is based on the same design criteria — to form groups that are task and interpersonally congruent, to form task clusters that clearly separate similar task items (those within the same cluster) from dissimilar task items (those contained in different task clusters), and to optimize the "goodness of fit" between task clusters assigned to people clusters.

Figure 1 shows six different kinds of designs (genotypes) that can be created with MAPS, [3] realizing that each of the genotypic designs has a range of design solutions from the two by two design (two people clusters assigned to two task clusters) to the n x n design (depending on statistical limitations). The different designs (outputs) result from the different combinations of inputs and analyses that are available in the MAPS design process. Figure 1, therefore, summarizes some key relationships and results from among the three steps in the core of the MAPS Design Technology: input, analysis, and output. Specifically, the three rows of Figure 1 indicate the particular input and analysis utilized to form people clusters — either task items, task and people items, or just people items as inputs to computing various multivariate statistics, etc. The two columns in Figure 1 represent whether the task items on the MAPS questionnaire specify operational activities or whether they specify problems and strategic issues.

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FIGURE 1
Characteristic Types of Organization Designs
from the MAPS Design Technology

Nature of task Items / Input Responses	Operational Activities	Problems and Strategic Issues
Task Items	Pure OPERATIONAL DESIGN	Pure PROBLEM-SOLVING DESIGN
Task Items and People Items	INTEGRATED OPERATIONAL- INFORMAL DESIGN	INTEGRATED PROBLEM-SOLVING STRATEGIC- PLANNING DESIGN
People Items	Pure INFORMAL DESIGN	Pure STRATEGIC- PLANNING DESIGN

We do not mean to suggest that organizations should have all six or even all four pure designs. If this were the case, the organization might spend all its energy and time **designing** for something rather than **doing** something. Consequently, only for some very unique situations (perhaps extremely dynamic and changing environments) would organizations be shifting designs frequently and have several different designs. In most cases, the organization will find it appropriate to have two formal designs, one that guides the day-to-day activities (INTEGRATED OPERATIONAL-INFORMAL DESIGN) and one that defines and addresses longer-range problems (INTEGRATED STRATEGIC-PLANNING, PROBLEM-SOLVING DESIGN). These two designs would co-exist but each would have a very different purpose. Having these two integrated designs will often ensure that the major components of organizational effectiveness are being explicitly approached, [4] while not absorbing the large amount of resources that would be involved by having as many as four distinct designs. However, two designs are already much better than only one design, for as we have stated earlier, the one design usually turns out to be the OPERATIONAL DESIGN which is ineffective for dealing with complex problems.

DESIGNING DIFFERENT PROBLEM-SOLVING
SYSTEMS WITH MAPS

Even with a focus on the INTEGRATED PROBLEM-SOLVING, STRATEGIC-PLANNING DESIGN, there are a number of alternatives to the designers. In particular, questions arise as to: (1) who will be involved,

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(2) for how long, and (3) will the individuals be working part-time or full-time in the design. The first question is usually handled by having representatives selected or elected (or on a voluntary basis) from each of the OPERATIONAL DESIGN categories in the organization (e.g., marketing, finance, production, etc.) based on some assessment of the individual's motivation and expertise to do various problem-solving activities. It is also possible for the organization to hire a number of individuals from outside the organization to engage in problem-solving functions. These individuals would then be involved in the MAPS design process.

It is really the second and third questions noted above which provide some interesting alternatives to the designers of the problem-solving system, and the decision on these two questions may actually help decide the first question of who should be involved. Figure 2 shows a matrix of four alternative problem-solving systems that can be created with the MAPS Design Technology by varying two dichotomies.

The first choice to the designer is whether the PROBLEM-SOLVING DESIGN is to be permanent or temporary. The permanent design means that the sub-units created by MAPS remain intact over time while the temporary design implies that the sub-units exist only as long as a particular problem (or a specified set of problems) is being addressed. For the temporary design, when the problem is resolved or viewed as managed, the sub-units disband.

The second choice to the designer is whether the members are participating in the PROBLEM-SOLVING DESIGN on a full-time or part-time basis. If full-time, the members are exclusively working on problem solving and they do not have any explicit involvement in the OPERATIONAL DESIGN of the organization. If part-time, the members not only spend several hours per week in the PROBLEM-SOLVING DESIGN but also have formal roles and responsibilities in the organization's OPERATIONAL DESIGN.

FIGURE 2
Alternative PROBLEM-SOLVING, STRATEGIC-PLANNING DESIGNS with the MAPS Design Technology

		Member Involvement	
		Part-Time	Full-Time
Continuity of Design	Temporary	Task Forces - Committees	Project Groups
	Permanent	Collateral Groups	Staff Groups

The previous two choices (two dichotomies) result in four possible alternatives for problem solving. Specifically, the temporary part-time design is referred to as task forces or committees. In this design, members who will maintain involvements in the OPERATIONAL DESIGN spend several hours per week (or per month, etc.) working on a specified set of problems. Once these problems are solved or managed, the task force is disbanded and the members again spend 100% of their time in the OPERATIONAL

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DESIGN. The temporary full-time design is called project teams. Here the members devote their entire time in the organization to a set of problems, and they do not return to their operational positions until the problem is resolved or managed. The permanent part-time design is labeled collateral groups. [8] In this case, the members are continually involved in two designs — the OPERATIONAL and the PROBLEM-SOLVING DESIGNS. The members divide their time between the two designs but as problems are solved the collateral groups are not disbanded. Instead they begin searching for new problems to define and confront within the collateral groups. Finally, the permanent full-time design is termed staff groups. This design is not disbanded as problems are solved but has members that do not have explicit involvements in the OPERATIONAL DESIGN. These members devote all their time to the staff groups on a continuing basis.

Considering the four pure PROBLEM-SOLVING DESIGNS, each one has different advantages and disadvantages for the organization and therefore the decision of which one to institute requires a careful examination of the specific environment facing the organization and the type of conflicts that may arise due to different designs. For example, an organization facing a very dynamic and changing environment will probably need a permanent design rather than a temporary one because in such an environment problems emerge frequently. It would simply be too costly to create a new temporary design for each new problem that a dynamic environment generates. On the other hand, an organization facing a fairly stable environment might not be able to justify supporting a permanent problem-solving system since such a design would be underutilized. Fewer problems tend to emerge in a stable-static organizational environment.

The part-time, full-time dichotomy affects the type of inter-design conflicts that are created and the kind of implementation problems likely to be encountered. The decision maker (designer) needs to assess the relative trade-offs among these issues in choosing one of the PROBLEM-SOLVING DESIGNS. For example, the advantage of the full-time designs is that the members are not generally biased by vested interests — i.e., they do not have an interest in how a particular problem is solved since they are not members of the OPERATIONAL DESIGN. However, such a full-time setting makes it difficult to implement solutions since the problem solvers have to rely on others to understand and accept their recommendations. In fact, the full-time problem solvers may have difficulty in even obtaining the necessary information and feeling for the problem since they may be removed from the day-to-day source of the problem. A part-time design, on the other hand, has members in both operational and problem-solving activities which fact enhances the likelihood that solutions will be implemented and that the information needed to solve the problem in the first place is available. Basically, the part-time designs have the members working on the problems that they have actually been experiencing in the OPERATIONAL DESIGN. But this tends to foster vested interests — members may have a definite stake in the outcome or proposed solution of the problem, or they may be "too close" to the problem to suggest creative, alternative solutions.

Consequently, if it is felt by the designers that members can be objective and that their support is crucial in implementing solutions, then a part-time design should be chosen. However, if vested interests might be strong (because of the type of problems expected) and if members in the

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OPERATIONAL DESIGN are willing to foster and support the problem solvers' efforts, then one of the full-time designs can be instituted. Once the part-time, full-time distinction is chosen, the designer can then select either the temporary or permanent design mode (or some combination) depending on the assessment of the organization's environment — the frequency with which complex problems are likely to emerge, and the corresponding need for an on-going PROBLEM-SOLVING DESIGN.

CONCLUSIONS

Once a particular PROBLEM-SOLVING DESIGN is chosen (i.e., one of the four alternative problem-solving applications shown in Figure 2), the MAPS Design Technology can be applied to actually create the chosen design. First, the particular members would be selected (or hired) for a temporary or "permanent" period of time to work part-time or full-time in the PROBLEM-SOLVING DESIGN. Next, the members would develop the task items for the MAPS questionnaire and then proceed through the succeeding steps of the technology. [3]

A central theme in this paper is that organization designers should consider the possibility of implementing simultaneous designs in order to extract and activate the potential resources in the organization. This may very well highlight and draw attention to resources that the organization was not even aware of, i.e., information and decision-making and problem-solving skills of its members who are constrained by the requirements of the single OPERATIONAL DESIGN not to solve or partake in such problem-solving activities. In other words, just as human relations consultants and organizational development specialists have attempted to mobilize resources **within** a given organization design, we are advocating that designers begin at the more basic level, the very structure of the organization, to consider in which ways and by which different designs the potential resources can be clustered and mobilized before they are developed. Such a philosophy and practice would be **creating** resources as much as simply identifying the apparent available resources.

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