

Adapting a Matrix Organizational Structure to the College of Dentistry at the University of Kentucky

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The mission of our nation's colleges of dentistry is to benefit the oral health of society by educating future generations of dentists, providing care for patients, conducting research to expand the knowledge base of dentistry, and providing specialized services to the public and practicing dentists. Effectively fulfilling this mission is the goal of all colleges.

The success of colleges of dentistry, like all organizations, is measured by the way in which they sense and creatively respond to environmental changes affecting their mission. Success can be measured in the short-run by productivity in patient care, education, research, and public service; by efficiency; and by satisfaction of patients, students, faculty, and staff. Over the intermediate term, colleges must be evaluated in terms of their adaptation and development. In the long run, they are successful in terms of their survival. The failure of colleges of dentistry to respond to environmental change and, hence, to fulfill their mission, defines the problem in dental education today.

A college's organizational structure should facilitate achievement of its mission. The failure of colleges of dentistry to organize themselves to achieve desired outcomes contributes to their unresponsiveness to environmental change and decreases the probability of realizing their goals. Although they exist to educate generalists, most colleges of dentistry have adopted the academic or-

ganization of the graduate research universities of which they are a part. Higher education generally is dominated by structures that encourage highly specialized graduate education. This manifests itself in academic departments of specialists who concentrate their energies on their discipline and who educate graduate students to become discipline specialists like themselves.

While this organization supports postdoctoral dental specialty education, it cannot fulfill the primary mission of dental education, the education of generalists. Academic departments in dentistry have considerable autonomy with self-defined goals and objectives. Not infrequently, and understandably, these are narrowly focused on specialty interests. Occasionally, they are antithetical to college goals. Because faculty in these departments gain their identity through specialty affiliation, departmental goals often eclipse college goals. It is difficult to orchestrate an efficient, effective, interdisciplinary educational program for general practitioners with a structure that is specialty oriented.

While such organizational deficiencies were manageable in an era of rapid growth and abundant resources, the present environment dictates a more deliberate coincidence of form and function. Today's colleges must be environmentally sensitive, mission focused, and outcome oriented to ensure rapid response to changes that can adversely affect their existence.

The purpose of this article is to describe the recent college reorganization at the University of Kentucky. The reorganization will allow the college to be more responsive to the challenges facing academic dentistry as we approach the 21st century.

Basis for Organizational Change

Strategic Planning. The College of Dentistry at the University of Kentucky engaged in an extensive strategic planning activity through the stimulus of the Pew National Dental Education Program. A basic assumption was that change is continuous and inevitable. It was also assumed that the rate of change will accelerate as technology advances. While acknowledging that substantive program changes were required, faculty determined that the most pressing need was to create an organization that responded effectively and efficiently to a myriad of environmental circumstances; that assumed, valued, and promoted change; and that adapted continuously to fulfill its mission. An organization that was environmentally focused and outcome oriented, rather than internally focused and functions oriented, would help achieve this goal.

Evolution of Organizational Structures. During the early 20th century, a model emerged for operating organizations that emphasized achieving efficiency through the extensive use of rules and regulations, centralized authority, and high levels of specialization.¹ This model is known as the mechanistic or bureaucratic model. Application of mechanistic principles led to organizations with a graded chain of managers

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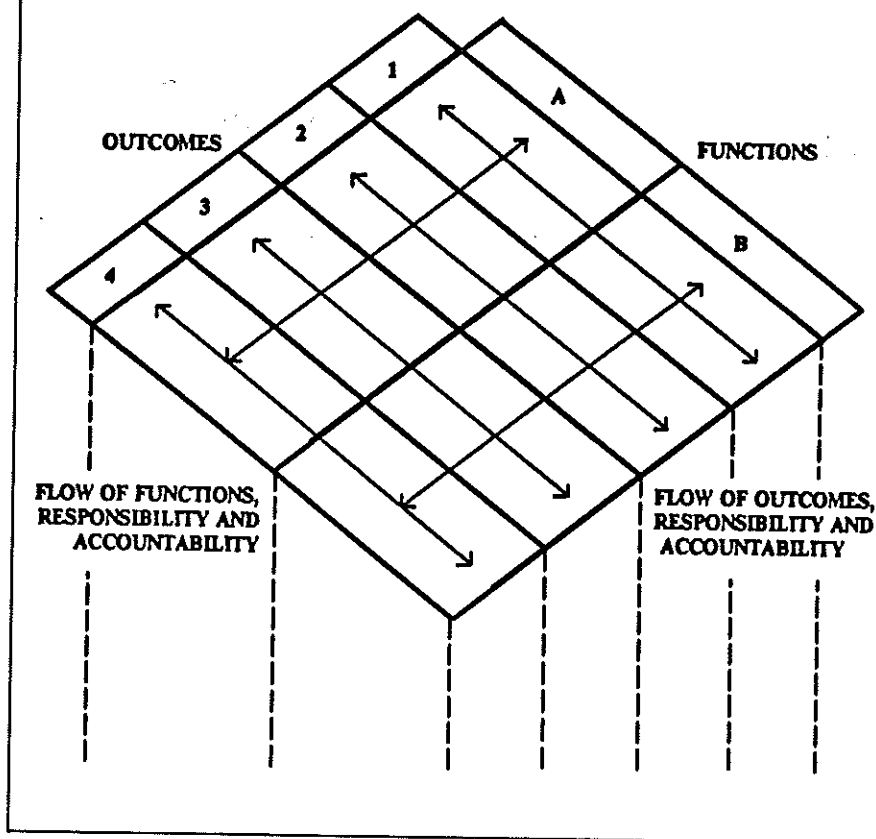
from the ultimate authority to the lowest ranks—a hierarchy. All communication passed down the command chain through each superior. The design involves domination, in that authority involves the legitimate right to exact obedience from others. The resulting hierarchical, bureaucratic structure is authoritarian. A bureaucracy is precise, stable, predictable, disciplined, and reliable.² It can achieve high levels of efficiency in stable environments.³

In contrast to the mechanistic is the organic model. Whereas the mechanistic model emphasizes efficiency in internal functioning, the organic model is characterized by its focus on outcomes. It uses outcomes rather than specialization as a basis for departmentalization.⁴ The mechanistic model maximizes efficiency and production. The organic model maximizes flexibility and adaptability, and is more effective in a changing environment because it encourages greater use of human potential by designing jobs that stress responsibility and growth.⁵ Decision making, control, and goal setting are shared throughout the organization. Communication flows throughout the organic organization, not simply down the chain of command, making it highly participatory. It de-emphasizes specialization and is decentralized and informal because it emphasizes delegation of authority. It focuses on the external environment and the effect of environmental changes on the organization and the achievement of its mission.

The Matrix Organization. The matrix is an organizational design that emerged during the 1970s and 1980s.⁶ It permits an organization to retain elements of a hierarchical structure with its associated strengths, while gaining the advantages of an organic design. The matrix balances departmentalization by function with departmentalization by outcomes.⁷ It achieves this balance by superimposing an outcomes structure on the traditional hierarchical structure (Figure 1). This overlapping creates a dual authority system that is the key distinguishing characteristic of the matrix. A matrix organization abandons the "one person, one boss," concept in favor of multiple accountabilities.⁸

Companies that use a matrix organization are General Electric, Citicorp, Bechtel, Dow Chemical, Hughes Aircraft, ITT, National Cash Register, TRW, Prudential Insurance, and Texas Instruments.³ While few academic organiza-

Figure 1. Overlaying of Outcomes on the Functional Base to Form a Matrix



tions have adopted a comprehensive matrix structure, the evolution of "centers" in higher education is a matrix concept. Multidisciplinary centers, such as cancer centers, geriatric centers, and research centers, that bring faculty from a variety of disciplines together to achieve a specific mission or outcome, are matrix organizations. They create a dual authority system where faculty report to a center director as well as to a department chair.

There are three indications for using a matrix structure.⁹ First, external pressures should require that the organization's energies be directed toward complex process issues. An example of this in dental education is teaching sophisticated therapy skills to student dentists using patients seeking care corresponding to the skills being taught; in other words, a complex process with a demanding outcome. Second, a matrix is indicated when an organization's information and problem-solving needs are overwhelming due to changing demands, organizational complexity, and interdependence among people. In dental education, this exists when technological advances rapidly change the way

dentists practice and when a group of specialists must work together to educate generalists. Third, a matrix is indicated when organizations must achieve economies of scale while maintaining high performance as judged by outcomes. This is now occurring in dental education, as colleges are expected to be highly productive despite declining resources. Movement to a matrix is not a minor management technique or an organizational fad. It is an organizational step that represents a substantive departure from other organizational forms.

The Kentucky Matrix

Matrix Formation. The University of Kentucky College of Dentistry had been organized into 11 academic departments representing, in general, the dental specialties. Adoption of an organizational matrix in January 1988 consolidated these departments into two: a Department of Oral Health Practice, and a Department of Oral Health Science. The Department of Oral Health Practice consists of faculty from the former Departments of Orthodontics, Pediatric Den-

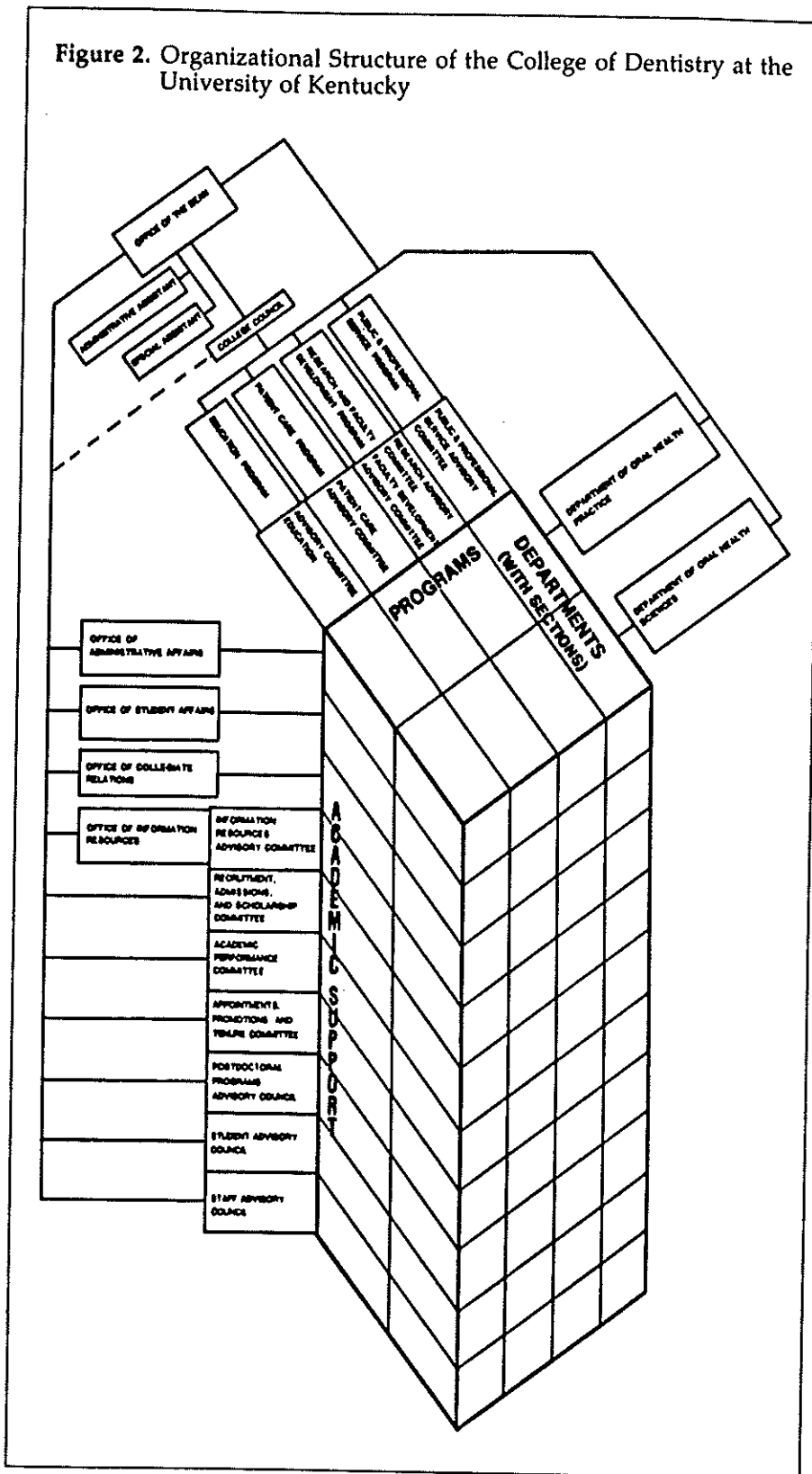
istry, Oral and Maxillofacial Surgery, Prosthodontics, Restorative Dentistry, Endodontics, Periodontics, and portions of Community Dentistry. The Department of Oral Health Science consists of faculty in the former Departments of Oral Biology, Oral Diagnosis and Medicine, Oral Pathology, and portions of Community Dentistry. Clinical disciplines are organized within each department into sections each with a leader appointed by the chair to serve in an adjunct administrative capacity.

Strategic planning had revealed that the previous mission statement was not a comprehensive statement of the college's reason for existence. The faculty concluded that the traditional university trilogy of education, research, and public service did not adequately emphasize the importance of patient care in a college of dentistry. Because oral health is basic to the mission of a college, patient care was elevated to a position of primacy with the three traditional programs.

The matrix was formed by superimposing these four dimensions of the college's mission—patient care, education, research and faculty development, and public and professional service—on the two academic departments (Figure 2). The leadership team for the college became the four program heads, the two department chairs, and the dean, together forming a College Council. At Kentucky, these college leaders were selected by faculty committees.

Leadership. The key participants in this academic matrix are: (1) the executive leadership, the dean; (2) the matrix leaders, the program heads and the department chairs; and (3) the faculty, who have two or more leaders (Figure 3). The dean must accomplish three things: balance power among the matrix leaders, establish the agenda for decisions, and set standards. These tasks are important in any organization, but are essential in a matrix. The dean's most important role is establishing a balance between the two arms of the matrix—faculty and programs. One of the necessary conditions for a matrix is a great demand for information. If an organization is to cope with such a demand, the dean can be only one of several key decision makers. The dean must delegate, but also set the stage upon which decisions are made. Finally, the dean must establish performance standards. Unless the dean has high expectations for the college, it is unlikely the matrix will achieve the desired outcomes. The program heads

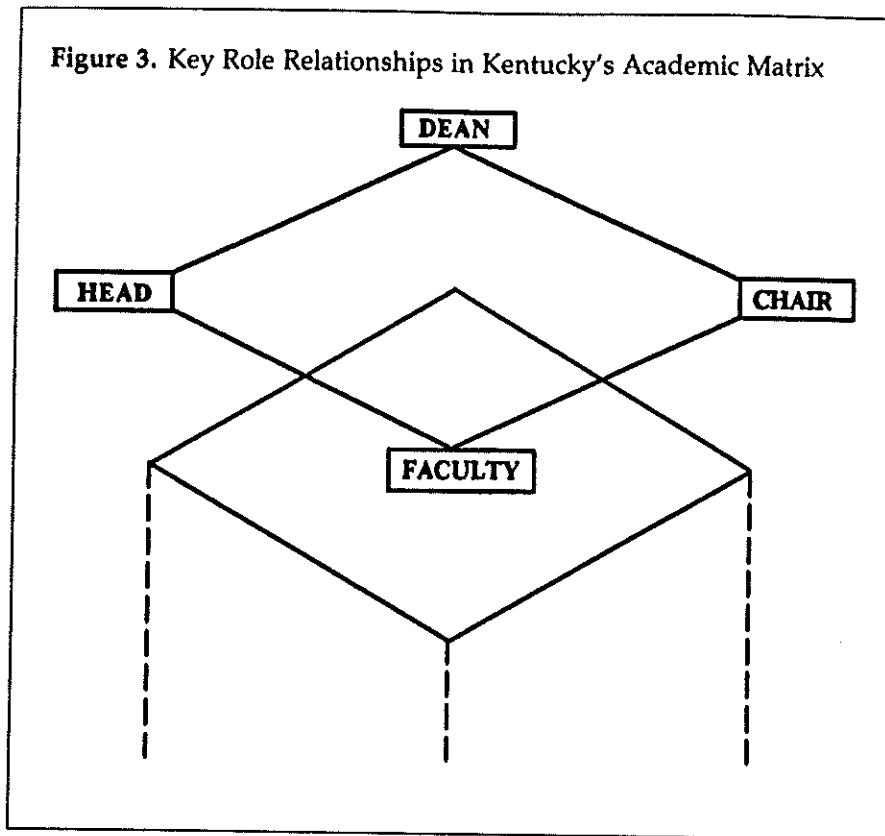
Figure 2. Organizational Structure of the College of Dentistry at the University of Kentucky



and department chairs report directly to the dean, but do not have a single line of command below them as in a hierarchical structure. They are in charge of programs (outcomes) and faculty (function), but do not have full authority over the individuals they are leading.

The role of the department chair is significantly different from that in a traditional organization. The two department chairs facilitate faculty participation in college programs by helping establish professional goals and by performance evaluation. In a hierarchy or

Figure 3. Key Role Relationships in Kentucky's Academic Matrix



resources will be in short supply. Competing claims must be resolved. Program heads must defend their requirements without overstating them. They must search, with their peers, for imaginative ways to share scarce resources. Finally, matrix program heads must establish a balanced orientation. They cannot be viewed as biased toward one functional or departmental area. Program heads are not comparable to the traditional associate or assistant dean, in that they have direct responsibility for programs and are not a part of the dean's staff.

The most challenging role in the academic matrix is that of the faculty, who have two or more leaders to whom they are responsible. In a matrix, power is shared among two or more matrix leaders, each representing different aspects of the college mission. Faculty are accountable to at least two individuals and in Kentucky's matrix up to five people: one department chair, and from one to four program heads, depending on the individual's program participation. The faculty member responsible to two or more leaders experiences anxiety and stress. These come from weighing the competing interests/emphases of the department(s) and the program(s). Faculty learn, however, that in the matrix, their roles give them a degree of influence not readily experienced in a hierarchical organization. They frequently find themselves in a neutral position between program heads and department chairs over some conflict. They learn that their opinions are taken seriously and can prove to be determinative. This is exactly how a matrix should work; decisions are made with the participation of all who have relevant information and expertise.

Academic Support. The organizational matrix at Kentucky is multidimensional, as illustrated in Figure 2. The third dimension of the matrix architecture is the activities traditionally referred to as academic support. Staff support is organized into four offices: Administrative Affairs, Student Affairs, Information Resources, and Collegiate Relations. Each of these offices is led by a staff office director responsible to the dean for the academic support activities of the unit. Faculty committee work, which is not advisory to the four programs, but rather supportive of the general academic mission of the college, also exists in this third matrix dimension. College faculty committees include: Appointments, Promotion, and Tenure; Academic Per-

bureaucracy, department chairs have authority over all aspects of the department: programs, priorities, faculty selection, assignment of faculty, evaluation of faculty performance, and decisions about faculty pay and promotion. They consult with the dean, but are self-contained in these matters.

In Kentucky's matrix, none of these responsibilities is the sole purview of the department chairs. They share them with the program heads, the leaders on the other axis of the matrix. Matrix structures typically require dual approval of performance evaluations and other human resource decisions. Tasks, assignments, and priority decisions are shared with program heads and often derive from decisions made by them. Department chairs must balance different program needs, anticipate education and training needs, and manage personnel issues. They must also orchestrate staff support and manage the associated equipment, facilities, and space. Department chairs must balance work loads. It is imperative that they know the college's program needs and projected changes well in advance, and that they coordinate these activities with program heads. They must be proactive with program heads if they are to carry out their duties.

The heads of the college's four mission programs focus on the external environment in which the college exists, and on the constituencies the college seeks to serve in fulfilling its mission. Program heads are responsible for ensuring that faculty efforts are directed toward program goals. In this regard, they have the same goal as the dean: high productivity, with outcomes consistent with the college mission. College faculty do not report to program heads exclusively, as they also report to their department chair. Program heads do not unilaterally decide on program goals and strategies. They manage decisions so that differences can be discussed and adjustments made in the interest of the whole. Thus they have the unique task of influencing behavior with limited formal authority. They must use their knowledge, competence, relationships, force of personality, and skills in group leadership to have people do what is necessary for the programs' success.

Program heads' efforts to manage consensus are demanding. The posture of program heads is one of reason and advocacy in their relationship with peers on both arms of the matrix. It is through these relations that they obtain the human resources to accomplish college program goals. They must expect that

formance; and Admissions and Scholarship. A Student Advisory Council and a Staff Advisory Council also provide advice and consultation to the college leadership from the perspective of these two constituencies. Finally, the college's postdoctoral program directors constitute a council to manage the unique issues associated with postdoctoral programs.

Operating Implications. Developing a matrix organization is more than changing a structure. A matrix organization must also be supported by activities called processes that give life to an organization's structure. A college of dentistry shares two major processes with all organizations: decision making and performance evaluation.⁴ Each occurs along both the functions (departmental) and outcomes (program) axes of the matrix. The college continually makes decisions about goals to fulfill its mission, and strategies for achieving those goals. Regular program evaluation leads to goal revision and renewed effort. At the same time faculty members must develop individual goals that enable them to grow professionally in concert with college goals. Regular assessment permits a determination of how personal/professional development goals are being achieved. Evaluation by the college leadership permits assessment of the extent to which personal/professional goals are integrated and coordinated with college goals.

Decision making along the programmatic axis of Kentucky's matrix is participatory. Program heads chair faculty advisory committees that work with them to continually monitor the environment for changes that might affect program performance and effectiveness. Program heads and the advisory committees hold monthly faculty forums to discuss program directions, thus gaining a broad base of advice and consultation.

The matrix structure and the decision making that derives from it is important because it supports a strongly held value of faculty for participation in decision making.¹⁰ In addition, it improves organizational effectiveness. Organizations with member participation in decision making are more effective in an environment of change than organizations in which there is less participation.¹¹ This is due in part to tapping the full range of understanding, knowledge, and potential of individuals in the organization.

Along the functional or departmental axis of the matrix, chairs work with fac-

ulty in a "development by objectives" strategy. Each faculty member, working with the department chair, establishes individual goals for professional development, along with annual objectives that will promote achievement of those goals. The explicit stating of individual goals and objectives permits negotiation across the matrix. Individuals commit themselves to the college's good through pursuit of their individual good. Faculty evaluate their professional performance annually through a personal review of their objectives. Department chairs use the achievement of yearly expectations as one measure of the faculty's annual performance review. The development by objective strategy (1) clarifies the college mission and focuses resources on goals, (2) provides a basis for establishing priorities, (3) permits evaluation of faculty and collegiate performance, (4) improves morale through increased communication and understanding, (5) facilitates integration and strategic planning, and (6) improves efficiency and effectiveness.

Advantages of the Matrix

A number of advantages of a matrix organization have been described.¹² Implementation of a matrix organization at the University of Kentucky is resulting in several important benefits:

- *Efficient Use of Resources*

The matrix facilitates the use of highly specialized faculty, staff, and equipment. Academic departments share specialized resources, thus minimizing duplication. This is particularly advantageous in the distributions of effort of individuals. Faculty are able to apportion their talents across a variety of programs with varying time commitments. This allows a particular dental specialist to be assigned to several different programs of the college. The college budget is developed based on programmatic needs directly related to fulfillment of the institutional mission, rather than being formulated by allocation to departments.

- *Flexibility during Periods of Change and Uncertainty*

Response to change requires communication that efficiently provides timely information to the right people. The matrix encourages constant interaction between programs and faculty. Information moves vertical-

ly and horizontally through the organization. The result is more and better information that permits appropriate responses to external conditions.

- *Academic Excellence*

There is a high degree of faculty interaction in the programs. Such an interdisciplinary approach encourages cross-fertilization. Faculty maintain contact with their own discipline by virtue of their departmental section affiliation. The matrix makes it possible for college leaders to delegate authority, thus providing more time for interaction with external constituencies, and for strategic planning. The structure promotes a multidisciplinary approach to education and research.

- *Improved Motivation and Commitment*

Departments are composed of faculty with specialized knowledge. Chairs and program heads assign these individuals responsibility for specific aspects of the program. Consequently, decision making within groups is more participatory and democratic than in hierarchical settings. The opportunity to participate in key decisions fosters motivation and commitment.

- *Enhanced Opportunities for Professional Development*

Members of matrix organizations are given considerable opportunity to develop their knowledge and skills. At Kentucky, faculty work on program advisory committees representing diverse parts of the organization. Each faculty member becomes more aware of the total college and its needs. Moreover, faculty of the college learn from other specialists because of their work together. This experience broadens each specialist's knowledge, not only of the organization, but of other disciplines.

Problems in a Matrix

Several of the potential pathologies of a matrix structure occur in conventional organizations; however, the matrix seems more vulnerable to a few particular ones.¹³

- *Uncertainty as to Who is in Charge*

Faculty have fears that the matrix leads to confusion, for people do not recognize just one "boss" to whom they are responsible. Matrix organi-

zations cannot rely too much on "informal" arrangements. Relationships between functional leaders—department chairs—and outcomes leaders—program heads—must be explicit so that people are in agreement about who is to do what under various circumstances. Properly used, a matrix does not leave such matters in an indefinite status; it is a definite structure and not a "free-form" organization.

- *Struggle to Maintain Balance*

The essence of a matrix is dual command. There is a balance of power, where the focus of power shifts constantly, each leader attempting to gain an advantage. In organizations that operate with a balance of power form, there is a constant tendency toward imbalance. As long as each dimension of the organization tries to maximize its own advantage, there will be a continual balancing struggle for domination. A power struggle in a matrix is qualitatively different from that in a traditionally structured hierarchy. In a matrix, power struggles are inevitable; the boundaries of authority and responsibility overlap, prompting people to maximize their own advantage. Leaders in a matrix must push for their advantage, but never with the intention of eliminating those with whom they share power, and always with a perspective that encompasses both positions.

- *Misunderstandings Regarding Responsibility for Decision Making*

Another potential problem derives from a mistaken belief that matrix management is the same as group decision making. The confusion of matrix behavior with group decision making arises because a matrix often involves teams of individuals working together, which suggests a group decision-making process. Building consensus is important in an organization, and even more so in an academic organization where colleagues are working in concert to achieve a mission. However, there are line responsibilities in academic organizations, and line responsibilities exist in the matrix. Even though program heads and department chairs work with faculty to gain advice and consultation, ultimately these matrix leaders must assume responsibility for the decisions made. The leadership in the matrix

organization needs to carefully clarify to all participants how decisions are made, and who is responsible for the decisions.

In Kentucky's reorganization into a matrix, several individuals were dislocated from positions of leadership. This resulted in a sense of disenfranchisement and a belief that they had lost their ability to influence college planning and decision making. While it is true that these individuals no longer have this direct authority or responsibility, they can influence planning and decision making by participating in the advisory committees and open forums that are part of the matrix. One of the strengths of a matrix is its ability to draw on the collective information and ability of all within the organization. It is a participatory structure even though in Kentucky's matrix fewer individuals participate in the college's formal leadership body, the College Council.

- *Increased Initial Costs*

Research on matrix administrative costs indicates that in the initial phases costs increase, but that as the matrix matures, these increases disappear and are offset by gains in effectiveness and productivity. In Kentucky's matrix, savings in administrative costs will accrue due to the reduction in the numbers of administrators in the college from the 11 former department chairs and two former assistant deans to an organization with only six major administrative positions. Further potential economies in a matrix come from two general sources; fewer poor decisions are made and there is a greater potential to reduce redundancy in human resources. The matrix improves the quality of decisions because it helps bring the needed information and emphases to bear on critical decisions in a timely fashion. Dual accountability in the matrix helps to eliminate redundancies. As one individual has stated, "There is no place to hide" in a matrix organization. This places accountability demands on faculty, reduces duplication, and enhances pressures for productivity.

- *Preoccupation with Internal Issues*

Because a matrix fosters interdependence of people and demands negotiating skills on the part of its mem-

bers, matrix leaders can become absorbed in internal relations instead of focusing attention on the environment outside the organization. When this happens, a college can spend more energy resolving its own disputes than in fulfilling its mission. The outward focus disappears because the short-term demands of daily working life have yet to be confronted and resolved. During the initial matrix implementation period at Kentucky, significant amounts of time have been spent on resolving problems precipitated by the reorganization and the need to function differently. As procedures have been developed for internal operations, the college leadership has increasingly been able to direct its attention to environmental issues and program development.

- *Organization Inertia*

Finally, a potential problem of a matrix is too much discussion and not enough action. Some believe that movement to a matrix can lead to strangulation of decision making. Delays may occur due to the need to process issues by multiple individuals. This can happen in a malfunctioning matrix. Whether it does depends on how well leaders understand matrix behavior. The matrix deliberately induces simultaneous decision making between two or more dimensions of the college. It can frustrate the organization's leadership. Leaders who feel emasculated by bilateral decision making will not be content in a matrix organization.

Changes Facilitated by Matrix

Significant changes have occurred at Kentucky since implementation of the matrix. These changes have been facilitated by the reorganization. The changes have been able to be made due to the shift of focus in planning, decision making, and resource allocation from a departmental to a college perspective.

Before reorganization, leadership for the college doctoral degree program was heavily focused in the office of the dean. The same circumstance existed for research, faculty development, public service, and to some extent, patient care. Delegated responsibility was diffused through the 11 department chairs and committee chairs. College-level respon-

sibility and authority for each component of the college's mission are now fixed with a program head.

For many years the college had attempted to change the way income from patient care was distributed to faculty as an incentive. Revision could not occur because department chairs could not reach agreement. After the matrix was implemented and after broadly-based faculty discussion, the college was able to transcend discipline disagreements and implement a system that benefited both clinically productive faculty and the college budget.

Previously, college travel funds were controlled by department chairs and the dean. Departments with greater resources due to clinical revenues or extramural support were better able to support faculty travel. Faculty in departments with fewer resources were constrained in their travel. Currently, all faculty receive a per capita allocation for travel and dues in a professional development account that they control. Two other pools of travel money are available. There is a research travel account and a faculty development travel account. Faculty apply for travel support from these two sources and awards are made by the head of Research and Faculty Development based on the review and approval of these two faculty advisory committees. Now all faculty are able to compete equally for college travel monies.

A similar circumstance existed with faculty salary reimbursement dollars from extramurally funded projects. Previously, department chairs controlled these dollars. Some departments were very successful in procuring grants and, as a consequence, had more discretionary money to enhance their programs.

In the matrix, all salary reimbursement dollars are pooled at the college level and managed by the head of Research and Faculty Development to achieve college goals in accord with advice of the faculty advisory committee. This committee recommended return of 50 percent of the funds to faculty who generated them for enhancement of their work. The remaining 50 percent is reserved for stimulating other college projects. The College Council approved this approach. The head of Research and Faculty Development and the advisory committee are also working to change university regulations so that salary reimbursement dollars can be used for faculty salary supplementation.

Since implementation of the matrix, the college has changed significantly in the way it manages patient care by student dentists. The head of Patient Care, with his faculty advisory committee, has designed a faculty-attending dentist model using a clinical team leader working with vertically integrated teams of second-, third-, and fourth-year students to manage patient care. Clinical instruction is still provided by discipline specialists. This multidisciplinary management of patient care and clinical instruction is facilitated by the matrix structure.

The college's instructional program is led by a head of Education who, with a faculty advisory committee, plans and implements changes in the college's curriculum. Development of the college's education program is not restricted by negotiations with 11 different department chairs. Currently, the head and the faculty advisory committee are evaluating the curriculum and preparing a plan for curriculum revision that will achieve the college's education goals.

The college's ability to manage service requests from the profession and the public has improved since the establishment of a program for that purpose. Extramural service activities now have oversight and direction. A major survey of the oral health of Kentuckians is being followed by the systematic development of targeted programs in oral health care to the underserved, specialty services to rural areas, and dental health education to teachers and school systems.

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