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Plan-Do-Check-Act and the Management of Institutional Research [1]

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Abstract

The Plan-Do-Check-Act Cycle is the basis to Total Quality Management operations. This cycle can and should be applied to institutional research offices, projects, and activities. Office operations are related to projects. By developing a business plan for projects, institutional support can be obtained. Project initiation forms then start a process which manages project activities until completion. Periodic reviews of the rolled-up data give the Check-Act. The P-D-C-A then forms the basis for managing the institutional research function.

Introduction

"The most effective strategies of major enterprises tend to emerge step by step from an iterative process in which the organization probes the future, experiments, and learns from a series of partial (incremental) commitments rather than through global formulations of total strategies. Good managers are aware of this process, and they consciously intervene in it." (Quinn, 1980, p58.)

Institutional Research (IR) is typically a staff function performed to reduce administrative uncertainty. Unfortunately, the factors that cause uncertainties, as well as the factors required to reduce the uncertainties, are at best only partially under IR's control. IR, as defined in the purpose of the profession, involves "the collection, analysis, interpretation, and delivery of information support to the various users in our institutions and activities of higher education" (AIR Purpose, 1992). In some cases, this is done in a given office. More commonly, it is done with a mix of central activity and dependence on the resources and activities of individuals outside of any formal office of institutional research. This situation requires that IR and its functions be carefully and properly managed. IR is not a process which, by its nature, takes care of itself.

The ability of the IR function to reduce uncertainty is the basis for power. Organizational power comes from control of any one of three basic sources: a resource (such as personal, equipment, or money), a technical skill (such as computer ability or statistics), or a body of knowledge relevant to the success of the organization (such as being able to address reasons that students do not graduate on time). Knowledge-based power is particularly important in that it anticipates and perhaps controls future events for the organization. It is important

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from the viewpoint of the activity with organizational power that the source of power be essential, be concentrated, and be such that there are no direct substitutes (Mintzberg, 1983). Also inherent in this basic conceptual model of power is that for power to be relevant, it must be held by someone with the will and skill to use it. In other words, IR functions have an inherent source of power if managed properly. This proper management implies the coordination with others who help perform the IR function.

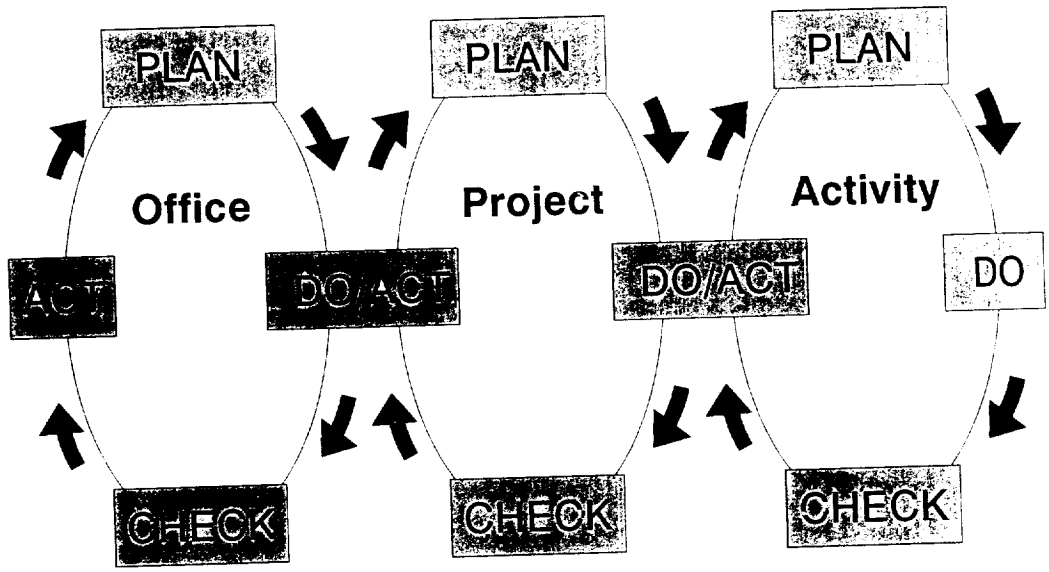
Managing institutional research requires procedures which will take advantage of our inherent basis of power, support participation in its shared nature, and result in the professional application of that power to the crucial uncertainties of our institutions. We have inherent potentials because of our professional niche. At the same time, these inherent characteristics will not be realized unless we manage IR functions to meet organizational needs. The most consistent way to manage our functions is to have a basic paradigm which will set our strategies, which will include others in a self-sustaining series of projects, which will focus on a centrally shared goal of continually improving quality, and which will form a basis of meeting the needs of our customers — even as those needs and those customers themselves change.

Numerous paradigms exist for process management. The new fields of quality management have themselves developed many paradigms, as Hunt reviews in his discussion of Philip B. Crosby, W. Edwards Demming, and Joseph M. Jurand (Hunt, 1982). From our experience, the paradigm which makes the greatest contribution to the management of IR is the Shewhart/Demming PDCA Cycle: Plan-Do-Check-Act. This simple circle has been the basis for some changes within our office and subsequent changes in the way we do business. We have used it as a template to manage everything from the direction the office takes to the projects and activities that make that direction a reality. The following will discuss how we apply PDCA as well as why it is applied. Some of the uses of PDCA we identify are at the office level, some are at the project level, and some are at the activity level.

The relevance of the quality concerns of Total Quality Management (TQM) to the operation of Institutional Research and colleges have been established by Heverly (1993) in her recent Professional File on "Using Total Quality to Better Manage an Institutional Research Office." As her institution pursued a strategy of TQM, the IR office employed the Hoshin Planning process to apply TQM to various projects. She gives examples of the use of TQM techniques on tracking customer request for data to adjust the process of supplying the data and on reducing the complexity of conducting and providing data from a high school senior survey. She also discusses the basic tools and concepts in her recent chapter on TQM in The Primer for Institutional Research (1992).

The following shows how one of the tools discussed by Heverly, the Plan-Do-Check-Act Cycle, can be related to the complexity of office management. The use of this tool gives an opportunity to relate office processes to a consistent conceptual model and to determine if the processes are sufficient and relevant for the pursuit of reducing complexity, scrap, and rework.

Figure 1
Plan-Do-Check-Act



The PDCA Cycle

The PDCA Cycle is shown in Figure 1. This cycle is specifically designed to facilitate incremental continual improvement through change. The specific steps are:

- PLAN — an event. This includes establishing the measures of success or quality as well as determining the process to be followed. It is often very helpful to have some type of conceptual model of the phenomena being considered. It includes defining and analyzing the problems, identifying the causes, and developing measures that can indicate improvement (Masaaki, 1986).
- DO — the event, preferably on a small stage. This is consistent with the concept of prototyping as well as the law of minimum intervention proposed by Hrebiniak and Joyce. "In implementing strategy managers should change only what is necessary and sufficient to produce anw enduring solution to the strategic problem being addressed" (Hrebiniak and Williams, 1984).
- CHECK — the effects of the event. The check can be in terms of the change in quality such as the number of defects. The final check is always the satisfaction of the customers. This requires an understanding of who the customers are and what their needs are.
- ACT — on what was learned. The process is modified to improve the quality of the product. If the product is information the improvement can be in increased reliability or validity. The improvement need not be to the product itself, but may be to the user of the product. For example, better training to use the product or better information of why it is beneficial to use the product. The improvement can also be in terms of the product or in the ability of the user to use the product. Regardless of how the situation changes, it changes for the better.
- Cycle — through the process. "Acting" causes the identification of the next situation for which there needs to be a Plan, a Do, a Check, an Act, etc. As Figure 1 shows, the doing at one level can result in modifying the cycle at the supporting level. The three levels are shown as the office or strategic level, the project or management level, and the activity or operational level. These three levels are connected by a combination for the DO-ACT events on the circle. This DO-ACT block is our way of indicating that how we ACT at one level depends on what we DO at the more general level. In other words, what we DO at the project level will require ACTING (adjustment) at the activity level. Doing at the office level will cause the need to act at the project level. When our office reduced its ability to do surveys, we adjusted our survey project process. When we planned the next survey request, we planned it as a coordinating function.

At the same time this DO-ACT block indicates that Acting at a more specific level will modify the way we Do things at the more general level. In other words, if we start meeting twice a week on an activity because we find out that once a week looses some of the value of the activity, then this is a change in the Doing of the project.

Applying PDCA

How do you start combining the day-to-day work of an institutional research office and the PDCA Cycle? In our office we recognize the three levels of work discussed above. They include the office or strategic level, the project or management level, and the activity or operating level. At each of these levels we have developed tools to ensure that quality is continuously reviewed and improved.

At the office or strategic level, we are concerned with the mission, goals, and objectives of the office. We need to constantly be sure that we are headed in the right direction, and that the projects we do and the consumers we serve are appropriate for the mission, goals, and objectives we have defined. We need to maintain the key working relationships with others at our university who are doing IR functions.

At the project level, we are concerned with presenting the highest quality information in computerized, written, graphic, or verbal presentation to our customers. To do this we need to constantly communicate with our customers and colleagues to ensure that the activities performed are necessary and sufficient to the project, and that these efforts result in reduced uncertainty on the part of our customers and our colleagues.

At the activity level, we strive to include the necessary individuals to produce a professional and competent sequence of outcomes. This, of course, includes integrating the activities of our office with those in other offices and also trying to facilitate distributed IR.

Figure 2 gives an overview of the matrix formed when you cross the different levels of work and the various stages of the PDCA cycle. In the following, the tools or techniques used for each stage of the cycle are identified and discussed.

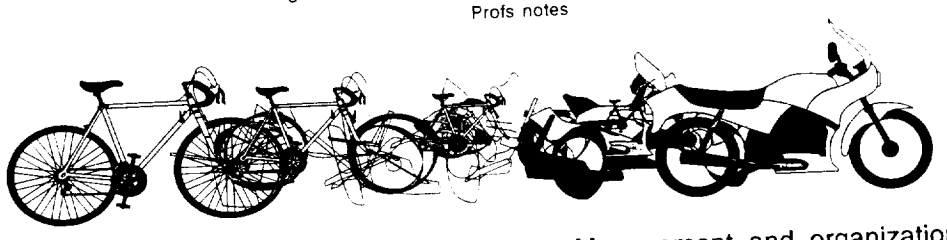
Plan

There are several levels of planning in the operation of the IR function at our institution. All are important to the efficient and effective operation of the office. Office Level:

The activity at the office level involves an annual one-day meeting. The key activities at this meeting include revisiting our mission, discussing our objectives, and considering our major projects. The plan which comes from this meeting is more in the form of identifying the types of projects which best meet the mission and objectives of the office and which are within the resource limitations of the office. Specifically, we took projects which fell in one of our four functions: information support infrastructure (data bases), standardized reports (such as IPEDS),

Figure 2
P-D-C-A at three levels of IR

Level	PLAN	DO	CHECK	ACT
Office	Annual meeting	Entrepreneurship Skills focus	Time summaries Use conceptual models Involve customers	Modify mission Adjust people skills to needs
Project	Business plan Project Initiation Form	Chunk projects Grieve old ways Manage-from-middle Tools-in-place	Project quality Block diagrams of surveys Review staff meeting minutes	Document process Train users Facilitate surveys
Activity	Short meetings Meeting agendas	Environmental scans Meetings with agendas Negotiations	Internal review of reports Short meetings Debriefings Profs notes	Ask "WHY" Learn team living and meeting leading



special studies, and standardizing codes. At the last planning session, held in conjunction with a parallel office (Student Systems), we invited some of our main customers from the Provost's Office to be a panel and tell us what they saw as key orientations of the university during the next few years. This planning process allows us to act rather than react. It also allows us to identify and progress in areas we feel are important and thereby have mechanisms in place to quickly respond to the needs of our users, feeling comfortable with the quality of the response provided.

Project Level:

At the project level, we have developed a general outline for a business plan. This plan, based on the work by White (1977) and Deloitte, Haskin, and Sells (1984), looks at a major project or group of projects as an internal small business or entrepreneurial activity. The purposes of this plan are to provide a written blueprint of the activity for the key players and administrators and to be a sales document to gain support of stakeholders. The major outline of the points of the plan includes:

1. Executive summary. A brief description of the anticipated outcome of the activity and the resulting benefits to stakeholders. Include a description of the current situation, how it will be changed, and what the key success elements are make this effort different from previous efforts. Also include a brief description of the key managers, the role they will play, and the anticipated cost of the endeavor.

2. Table of Contents.

3. Management and organization. An overview of the structure of the activity, a synopsis of the background of each member of the project team, an explanation of any shortcomings of this team and how they will be handled, and a description of the role that others will play and how they will be brought on board.

4. Product. A short history of the service which has been provided in the past. Include a block diagram or flow chart if appropriate. Completely and concisely describe the proposed service and include an example of the service. Prototype documents which will be needed or will be created. Use simple language. Establish milestones and discuss how success will be defined. Discuss needs for raw materials, cost of success and maintenance, and the quality control plan.

5. Marketing. Show how the service satisfies a need. Define types of customers and describe benefits as well as costs. Consider competition and/or what they will most likely do in response. Discuss distributing and selling the service. What will be needed to distribute? Who will sell the service and how will demand be met?

6. Financial information. Describe the resources needed to be successful. This may include people, equipment, and alterations in policies and procedures. The people costs may include training. Describe how resources will be used. What type and amount of support will be needed in addition to financial?

7. Appendixes. Milestones, flow charts, literature, etc. This level of project planning has been used primarily

for the establishment of a new function for the office where two added individuals, with the assistance of several office members, are now in the second year of a major activity to standardize codes and data element definitions. All indications are that the business plan which was developed and shared with key administrators was a success. We have also shared the outline with several other colleagues who are embarking on major projects within the university.

The unique component, and one of the more difficult elements which the business plan requires that you address, is the measurement of success. How will you know when the situation has improved? At the same time, this must be an element for others to use to show their directors that they have used their resources wisely when they supported the activity.

Planning at the project level is also done with a Project Initiation Form. This form requires that key information be provided on who, what, when, where, why (sometimes inherent in the who), and how (if known) the project will be done. This form feeds a time-recording system, and the office records the time spent on the project until the project is completed. It is useful for internal purposes (to know who our customers are, what types of projects we're working on, and where our man-hours are spent) and also to share with the requestor in order to come to an agreement on the scope of the project. It specifies what the office will do, what is seen to be the outcome of the project, and what defines project completion.

Activity Level:

Planning at the activity level is done informally with short meetings. These meetings generally occur between office members prior to visiting key administrators, after visiting key administrators, or upon receiving or initiating a project. We also hold a weekly, short (one hour) staff meeting where there is discussion of current projects, upcoming activities, and any all-important "grapevine news."

Do

Doing the work of the office is a study in opportunistic operations. While we have our concept of how things will go, we are always mindful of the influence that external forces have over our activities. Because of this, we try to follow several simple implementation rules.

Office Level:

While there is no intent to argue that these and other simple rules are the most appropriate for an office or for the management of 'doing' the institutional research function, there is the need for consistency in the 'doing' phase of the PDCA. For the long range management of the office, vision or entrepreneurship is needed in determining the purpose and functions of the office. If the purpose and functions do not benefit the institution, then one will soon find that instead of developing and marketing a product, one is on the outside of down-sizing. We must continue to take a value-added approach.

Professional development (or a skills focus) is stressed for all members of our staff. Each staff member has a general area of expertise which is considered in project assignment. However, new types of projects are always coming up along with new tools and techniques. In order to be effective, staff members need to be current with the latest developments. Cross-training is also emphasized. Given the nature of our business, it is not uncommon to have feast and famine in some of these areas. For this reason it is important that more than one person in the office be capable of taking on a given type of project. This is also important in case of sickness or turnover.

Project Level:

At the project level, IR must employ a rational set of tactics and engage in making good things happen. We will not win all the battles, but we can not afford to loose all the wars. This requires that we adjust our ends to fit the means, keep our objectives in mind, educate the customer, pursue activities which accomplish multiple objectives, stay flexible, and retreat when a battle cannot be won.

The key rule of project management is as Judith Hackman notes: Chunk wisely. "The ability and natural tendency of the human mind to organize bits of information into logical chunks or patterns is an essential part of information processing and memory" (Hackman, 1989). Almost every process can produce various combinations of projects or chunks. The critical chunking is to get the essence of the next step as seen by the critical stakeholders. The project chunk must be doable and must make a difference. In the best world, it should be finishable in two to four weeks of dedicated effort. This is not always possible. Some projects/chunks will be completed "yesterday" while others will span months (largely due to the number and frequencies of projects that need to be completed yesterday). Other projects/chunks are more a progress report on a continuing process such as in the process of standardizing data codes.

To determine the different chunks, it is important to consider who will be contributing to the effort. If multiple people are working on it, it is apt to be completed more quickly. Note that there is no requirement that these individuals work in our office. Often the essential individuals work outside the office and we go ask for their help. These external resources should not be overlooked.

As we work through our projects to create new processes, we also replace existing processes that are near and dear to many. When we are creating or changing something, we are laying to rest whatever we are replacing. In projects and activities, people must accept the loss of a familiar, if not cherished, old way of doing things. The stages of grieving from Kubler-Ross (1974) are a reasonable

model for developing a strategy of change for a project. First people must work through the denial "there is no need to change." Next they must work through their hostility against the changer — "it's all his fault; if he wasn't meddling, it wouldn't be necessary." The third stage is bargaining — "can we still do it this way if we add more computers?" Depression sets in as the last step before acceptance. It is important to prepare for these stages of denial, rejection, anger, etc. The more solid your business plan (especially need for and benefit of the change), the more likely you are to progress smoothly through these stages.

Related to the adjustment to grieving model is another rule we try to use in our project management; we are managing-from-the-middle. In other words, as we DO the project, we try to place it in the context of a gradual trend, rather than proposing it as something brand new. This requires we look back as far as we look forward. The intent is to help others see our proposal as a logical sequence towards progress — not as a new innovation. The outcome is that we are also in a position to recognize improvements made by others in what becomes a "no-fault" process.

Finally, we try to only do things which use tools-in-place. All too often doing projects is exciting enough without depending on the innovation of new technology to bring a project to successful completion. Quality data cannot wait on 4GL or object-driven data bases. Other benefits of using tools in place is keeping the cost down and completing the project sooner.

Activity Level:

On the activity level of doing, we scan the specific situations frequently, gain additional information where possible, develop agendas for each project, involve others, balance services, and take notes. We work at making activities serve multiple projects where possible. By setting and sending out agendas and minutes before meetings and providing participants with a summary of our notes from the meetings, we empower participants to 'do' rather than review. With more work and less people, these procedures save our most valued resource — time. It has made a great deal of difference in the success we have had in the operational art of Doing (McLaughlin and McLaughlin, 1981).

Check

Checking is probably the most overlooked aspect of the management process. This is unfortunate because it is imperative to success. How do you know if you have succeeded without checking your progress.

Office Level:

One way we check at the office level is to measure what we are doing for whom with our time resources. As we 'do' our projects, we use a very simple time-accounting system. Members of the office are given a time sheet each week. The sheet includes those projects which have been initiated using the project initiation form, a set of ongoing processes, and a set of standard categories for duties such as teaching and administration. Each individual is required to provide a distribution of hours over the projects with precision not to exceed the nearest half-hour.

These time sheets are collected by the secretary and summarized periodically. They are used at our annual planning meeting and are essential to assessing how well the office as a whole is meeting its mission, goals, and objectives. They provide information on who has been working on what, for whom, and for how long. They also give valuable information for trend analyses of customers and projects. Another office-level use of the time management process is in personnel evaluations.

The time management process is being converted from manual to on-line. The new system has a project data base managed by the executive secretary. Each office member inputs their hours using a mainframe exec that we are all linked to. Simple SAS programs are used to create summaries. This is practicing a point made previously; use existing tools rather than waiting until you can create/buy existing ones. If we had waited we would have lost 1.5 years of information!

Summarizing time management forms and presenting them to administrators as a way to verify what we are working on or to inform them of priority projects is a way to inform others of the complexity of the technical projects we work on. It is also a mechanism for renewing the projects.

A strategic form of checking also comes from relying on conceptual models and prior work of others. An example of the use of conceptual models is the use of the PDCA Cycle in the development of code standards. We established four types of standards and project goals:

To discover, define, document, and apply tools and techniques for standardizing university information by efforts to:

1. Identify critical and key university entities and related data elements and codes (P).
2. Define and document these entities and related data elements and codes (D).
3. Measure and verify data and code quality and integrity for these entities and related elements and codes (C).
4. Establish an on-going process of managing standardized entities in terms of data element edit, validation, update, alteration, audit, correction, and distribution (A).

This form of checking includes sending our ideas and work in for collegial review as articles and paper presentations (Balkan, McLaughlin, Harper, 1991).

Project Level:

Checking using conceptual models at the office level is consistent with the increasing use of flow

charts and block diagrams on projects which involve processes. We find that it is easier to visualize an activity if we develop a model for the activity. Once a project is identified, we use a block diagram to identify the various components of the process. This is an excellent way to achieve consensus across those in various offices.

We also use this form of checking when we work on questionnaires. After the design of the instrument, on occasion we work with the customer to create a block diagram of the process being surveyed and then to write the question numbers in the appropriate blocks. The rule is that each block should have related questions or the diagram should be modified or the questionnaire should be modified. We find that this is a very good way to help the customer get what they need — especially when the initial request is not based on actual need.

Another simple check in our project management has come from instituting a customer satisfaction survey which goes to the person requesting a product. This simple one-page form asks the requestor, "Did you like what you got? Was it what you wanted? Were we courteous? Have you any suggestions for improvements?" Usually the form comes back with full indication of satisfaction. On some occasions we get specific information and suggestions for improvements on which we can ACT.

Activity Level:

simple check at the activity level is the "one-minute meeting" on key activities in projects. These are conversations after key meetings where we try to always have two people so they can discuss what actually happened. We review minutes from preceding meetings in some of our "one-minute meetings." Our staff meeting includes a list of projects and activities from the preceding meeting, which helps keep progress defined as finishing key activities.

Another form of check is an internal check, particularly for our project reports. We have all taken several training sessions on writing, editing, and proofreading. We have a practice that reports will be read by several other individuals before they are released. It has taken some adjustment, but the results have been very helpful. The advantage is that after a internal critique, the product is better and the author(s) is more likely to be prepared for questions from an external source.

Act

Planning, doing, and checking are just busy work unless you are willing to act. Don't assume that an act is equal to a change; it could be the decision from checking is that change is not necessary at the moment. However, for the acting to take place there must be a conscious decision not to change, and then a continuation of the PDCA cycle.

Office Level:

At the office level of adjusting, our annual office planning meeting includes the review of the mission. In fact, the mission has shifted every time we have reviewed it. Increasingly we put our resources into the development of an information infrastructure and into the development of customer skills to use the infrastructure. One of our biggest successes here was to document frequently requested information and create an on-line, point and push system that allows the requestor to run their own program. This saves the requestor time, and more importantly, frees office personnel to work on new projects.

The other adjustment has been a large increase in the amount of training of office personnel. Everyone has taken training. We have discovered that the technical skills are important only if we have the personal, communication, and coordinating skills needed to use and share our results. We are training ourselves to be trainers. We are concentrating on personal communication and leadership skills. These skills empower IR staff members to empower others in the university community. Once again, given the position of IR in the organizational structure, we cannot rely on formal authority for power; instead, we must sell the benefits of improved information to our customers.

This focus on training came from some rather frank discussions as an office and as individuals. We have had to overcome the traditional belief that training is for those who are lacking. There are still those out there who ask how we can afford to train. Our answer is that we can't afford not to train. A recent paper by Terenzini has looked at the skills involved in IR and does an excellent job of reminding us that we need technical skills, we need conceptual skills (such as an understanding of what is known about higher education), and we need knowledge of what is happening in our institutions (Terenzini, 1991).

Along with this training has come an increase in responsibilities which has resulted in position upgrades for several staff members. In an economy where rewards in the form of salary increases are limited and where staff members are asked to do more with less, it is important to realize the motivation tools that are available. Empowerment, inclusion in decision-making, and continued training are the way of the future. More changes are being planned. It is not that we can afford to upgrade our skills and positions; we can't afford not to upgrade them.

Project Level:

Obviously the office-level actions impact the projects we've been working on. However, they are not the only actions taken. We have changed our approach on survey projects. Rather than do the survey ourselves, we work to utilize the Center for Survey Research which is charged with doing surveys. Each time we work with them, we discover ways to streamline and improve our processes. The

same holds true for our customers. Having worked with a client gives you valuable information on what changes can be made to improve future projects.

Another success was recognizing that we no longer had the resources to conduct focus group interviews. Instead, we've developed a training session that teaches groups to conduct their own focus group interviews. We have developed an outline on how to do a business plan and are working with another office on how to do a day-long workshop which will identify a problem and take a new approach to its solution (TQM tools).

Activity Level:

There are any number of examples of how acts take place at the activity level. These include recognizing that your office depends on good teamwork and taking action to ensure that office members understand their role and others' roles on the team and learn to alter their activities to best utilize these differences. This can also be done with learning about how people with different personalities can work together. It can mean a heavy emphasis on how to express yourself to others.

It may mean being more formal with some and less structured with others. Similar improvements have been made regarding group processes. We recognize that given our changing mission to teach rather than do, it is important that we are all able to effectively interact in group situations. This includes understanding group interacting, personality types, and your own management style.

Finally, we are always looking for ways to more effectively use our resources. The key to this is asking "why?". Why do we do it this way? Is there a way to mechanize or train others? An example of this is the discontinuation of the Fact Book. We still maintain a computerized form which can be printed by the user if they need a printed copy. We approach providing descriptive reports with the question "Is there any way this will be the last time I will need to do this report?" Often the answer is in providing the user with the information infrastructure and a "How to do it" report.

Summary

As was noted earlier, our office has started making use of the PDCA Cycle for the purpose of focusing the office projects and also for the process of implementing various activities of the office. This is certainly only one of numerous alternatives. It does fit within the basic set of organizational activities which are performed by institutional research and within the organizational context within which we do our work (Presley, 1990). It is an alternative which seems to work for us, and it seems to give us an appropriate bridge to quality institutional research (Sheer and Teeter, 1991).

Applying the PDCA cycle has allowed us to improve our skills in relevant ways. We have improved our products in appropriate fashion. It is action oriented and leads to good things happening. We and our customers have become quality involved. It has not created barriers between us and those who are our customers nor between us and those with whom we share the current set of challenges and opportunities. We have a sense of a way to anticipate the future and our customers see improvement. None of us knows what the future holds. Therein lies the power of information. From here, and from the way we got here, PDCA seems like a good idea. In the wisdom of the ages and the words of the sages: "Try it, you may like it."

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THE AIR PROFESSIONAL FILE—1978-1993

A list of titles for the 48 issues printed to date (8/93) follows. Most issues are "out of print," but microfiche or photocopies are available through ERIC (see *AIR Directory*, p.18). Photocopies are also available from the AIR Executive Office, $3.00 each, prepaid, which covers just the costs of postage and handling.

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