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Industrial Technology Program Enhancement: The Importance of Strategic Planning

by Dr. Dan C. Brown & Dr. Ron Meier

In today's rapidly changing, reconfigurable workplace, work has become information-oriented and knowledge-intensive. To keep up with these workplace changes, a new fundamental approach to the process of overseeing the education and training of the 21st century workforce has emerged. Success, in this intensely competitive, global, market-driven economy depends on having capable "educational processes," and ample resources to enhance or optimize these processes. In the context of higher education, the major input resource for a process capable community college or university is a well designed strategically managed educational system. It could be argued that this has tremendous implications at the program level for industrial technology programs.

Reich (1993) stated that education has been portrayed as "one generation's investment in the next." This could aptly describe the philosophy of industrial technology programs whose fundamental intent is to equip students with the knowledge, skills, attitudes, abilities and values essential to the continuing development of society, business and industry. Strategic planning is an active, dynamic process that should neither be based on an individual's authoritarianism, nor exclusively on intuition, premonitions, or gut feelings. Strategic planning should be both logical and scientific, with the scope, goals, and objectives that are clearly defined. Both the business world and institutions of higher education have been successful at adopting strategic planning practices.

The process of strategic planning is conceptually similar for both business and academia but, they differ primarily in the nature of their scope, goals, and objectives. Business enterprises are profit driven, and act in the interest of increasing their shareholders profit margins. Institutions of higher education and their respective educational programs typically have a more humanistic approach, one that is results oriented and defines learners, educators and citizens as partners in the educational system.

The Need for Change

Together, education and technology will be the bridge that takes our workforce well into the twenty-first century. Educational programs and institutions of higher education need to be proactive leaders in our changing world, and not be followers and reactors to short and/or long-term problems. Strategic Planning has emerged as a most promising tool to help assure that the proactive mode is prevalent within institutions of higher education. Although many community college and university administrators (department chairs and deans) claim they do strategic planning - the reality is they often do not. The documents administrators most often utilize are tactical plans not strategic plans. Tactical plans identify routine or operational goals, objectives, supporting activities, resource requirements, timeframes and accountability. Whereas, strategic plans identify breakthrough activities or initiatives where significant organizational improvements can be made (Bechtell, 1995).

One key problem facing education is that while societies, communities, values, and even laws have changed and evolved, many educational institutions themselves have not. Successful planning should be positive and built with the insights and contributions of all educational partners and results in solid, understandable, and valid changes. Educational change should be systematic, focusing on both immediate and long term improvements and additions to our educational system (Warnock, 1996).

Purpose of this Paper

Strategic planning focuses teams of people on achieving efficient and effective long-term control and utilization of existing resources. The Hoshin planning process is one strategic planning methodology that has been highly successful in meeting these requirements in both venues. Applied in the academic environment the Hoshin process is a systematic planning methodology for defining key long-term – department wide breakthrough activities, while keeping in mind the fundamental performance measures required to control, evaluate, and monitor the organization's projects and operations successfully (Bechtell, 1995).

The purpose of this paper is to illustrate how the Hoshin planning tools can be utilized to develop strategic planning documents in the Industrial Technology program or department level environment. Specifically, how to link department strategic plans and tactical or action plans to better organize and sequence program improvement efforts through the inputs received from the students, industry, other key stakeholders, and faculty members. This paper examines strategic planning in higher education, Hoshin Kanri history and background, Hoshin methodologies, and implementation strategies.

Strategic Planning in Higher Education

The concept of strategic planning is relatively new to higher education leaders. Strategic planning evolved from the realm of global military operations.

When examining strategic planning literature it is heavily focused on either the military or the business world. From the 1960's until the mid 1970's there was a boom period for strategic planning in the for-profit sector. During this time higher education was fundamentally a growth sector that enjoyed substantial public trust and confidence. Planning in higher education generally referred to expansion and new facilities. From the late 1970's through the 1980's, higher education encountered a mixture of demanding demographic, economic, and technological changes. Higher education costs outpaced inflation and educators' ideas about planning began to change.

George Keller's 1983 book *Academic Strategy* (voted by both the *New York Times* and *Change* magazine as the most significant book of the decade among higher education administrators) offered a point of reference for a critical shift as colleges and universities began to further investigate the impacts of strategic planning. In the 1980's, higher education's definition of strategic planning became a "disciplined effort to produce fundamental decisions and actions that shape and guide what an organization is, what it does, and why it does it" (Bryson, 1988, p.4). Planning in the 1980's was about ideas such as strategic niche, competitive position, shareholder values, Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis, and core competencies.

The 1998 Council for Higher Education Accreditation's *Recognition Standards* defined an expectation for "evidence of policies and procedures that stress planning and implementing strategies for change" (CHEA, 2002) indicating that accreditation agencies believe strategic planning represented good practice. As we progress into the 21st century, higher education planning has moved beyond the traditional focus of niche markets and competitiveness to encompass ideas such as re-engineering, business transformation, customer relationship management, and continuous quality improvement. University administrators and leaders have become

more knowledgeable about the limitations of cookie-cutter planning methodologies (Rowley and Sherman, 2001). Keller (1997) noted that strategic planning is now about organizational learning and creativity. College and university leaders need to challenge their basic assumptions and consider radically altering every day processes. Strategic planning today needs to focus more on dynamism, the future, flexibility, organizational intelligence, and creativity. The real measure of success is about how to move beyond strategy to transformation. In summary, ideas regarding strategic planning and planning practices in higher education continue to evolve and mature.

History of the Hoshin Process

The Hoshin process was developed by the Japanese in the 1960's as a derivative of Management by Objectives (MBO). Hoshin planning is also known as Policy Deployment or Management by Policy. One of the first American companies to use the Hoshin planning process was Hewlett-Packard in the mid 1970's. Hewlett-Packard learned the process from its Japanese subsidiary Yokogawa Hewlett-Packard (YHP). Other well known companies that have benefited from the Hoshin planning process include: Intel, Proctor & Gamble, Ford, Florida Power and Light, and Xerox. Florida Power and Light is the only American company to win the highly prestigious Japanese Deming Application Prize. The Japanese words *Hoshin Kanri* can be generally interpreted as setting the direction for the entity whereas the words *Nichijo Kanri* can be interpreted as the fundamentals of daily management. The unification of these two concepts is what drives the success of the Hoshin process (Bechtell, 1995).

Hoshin Methodology

The Hoshin approach facilitates the achievement of:

- Breakthrough goals and objectives.
- Action plans that adequately support the breakthrough activities.
- Review of action plan progress.
- Changes to the action plans as required.

- Continuous improvement of key department improvement processes.
- Organizational learning.

The Hoshin approach ensures that everyone on the team is working toward the same end. The plan is hierarchical, cascading down through the team and to key department process owners. Ownership of the supporting strategies is clearly identified with measures at the appropriate level or process owner. The Hoshin process fits under the umbrella philosophy of quality management. The plan-do-check-act (PDCA) process improvement cycle is a fundamental iterative element of the quality management problem solving model (Shewhart, 1931; Deming, 1982). In practice the Hoshin approach conceptually applies PDCA cycle to the management process (Bechtell, 1995). This cycle is used repeatedly in strategic plan development, implementation and review.

The underlying idea behind the Hoshin approach is to make the higher-level department vision a reality. This is best achieved by making certain that all key department stakeholders comprehend and buy into the long-range direction. Additionally, all employees must perform their work according to the strategic long-term and daily fundamental plans. The second feature of the Hoshin approach focuses on the process measures which must be evaluated and controlled to guarantee the continuous improvement of the key operational processes. The Hoshin approach includes:

- Identifying critical issues facing the department.
- Establishing objectives to address these issues.
- Setting overall goals.
- Developing supporting strategies.
- Determining objectives for each strategy.
- Establishing process performance measures (PPM's).
- Establishing fundamental measures (Bechtell, 1995).

The review of the strategic plan's progress follows the PDCA cycle, and

it applies to all levels of leadership within the department. In the Hoshin process, there are two kinds of planned activities: breakthrough activities and business fundamentals or key process-monitoring activities, also known as the business fundamentals table (Bechtell, 1995). The department should have a clear mission/scope statement or statement of purpose. In other words, what added value do internal and external customers receive via the products or services offered? Also necessary is a long-range vision: Where is the department headed in the future?

Breakthrough Activities

Breakthrough activities are those directed at achieving significant performance improvements or making significant changes in the way a department operates. These activities are typically directed at overcoming the critical issues the organization will face in the next two to five years. In the broadest sense, these issues may relate to resource management, growth or market share; toward a specific issue such as a quality problem; or in support of a new product or service introduction.

All specific improvements or changes to be made by the organization should contribute directly to the major objectives. These are the Hoshin strategies chosen by the leadership team. Each strategy has a strategic goal and process performance measures to continuously monitor performance on each individual strategy. This ensures that the Hoshin strategies are being properly carried out

and progressing toward their individual strategic goals. If all strategies are successfully accomplished (all strategic goals met), the overall Hoshin goal also will be met.

Education/Business Fundamentals

Realistically most of an organization's time must be devoted to keeping the program running, i.e., enrollment data trends, FTE generation, equipment purchases, and transfer student trends. The monitoring of these value-added activities needs to occur across the program on a regular basis. This is how the process owners are able to take real-time corrective action for continuous process improvement. An example of these selected monitoring points or business fundamental measures for an Industrial Technology program that focuses on enrollment trends is illustrated in Table 1.

The Business Fundamentals Table (BFT) information is collected using process performance measures (PPM) that reflect the progress of individual process activities. For example, in the table above the Manufacturing sequence enrollments have steadily declined over the five year period. This would indicate a PPM that demands immediate attention to assure the long range health of the sequence. This PPMs reference to a key business fundamental highlights a problem. Corrective action plans need to be developed that address this problem.

Table 1. Industrial Technology Sequence Enrollment Trends, 2000-2004

	2000	2001	2002	2003	2004
Construction	159	188	197	189	203
Manufacturing	103	97	72	64	51
Graphic Communication	37	47	42	36	40
Industrial Computer Systems	67	114	110	119	106

Balancing Activities

Breakthrough activities occur when the business fundamental activities are under reasonable control. Once the BFT is under control, time should be devoted to continuous process improvement. After achieving this state of continuous process improvement, the organization has time to perform breakthrough activities.

To some extent, the amount of time spent on breakthrough activities is self-regulating. When an organization is struggling to bring key business fundamentals into control, as in the example above, immediate attention must be focused on correcting the problem. This will result in delaying or postponing a loftier Hoshin objective but is an essential first step for long-range success (the vision). As fewer business fundamental problems are illustrated, more of the organization's time may be spent working on the strategies to reach the Hoshin objective. As less time is needed to address business fundamental problems, more time becomes available for identifying breakthrough activities.

The Annual Hoshin Review

Each objective has a Hoshin review table, with all supporting strategies listed. For each strategy, use the PDCA cycle to measure the progress against the goal set at the beginning of the year. In addition, record actual results-to-date. Note any discrepancy between the results and the plan, and state the impact on the strategy for the coming year. Complete such a review both for the objectives that were successful and those not attained. For those objectives that were completed successfully, perform an analysis to determine what went right and to determine if the supporting strategies and performance measures initially established were truly appropriate. Also, note any exceptional results and how they were obtained. This step is critical to capturing knowledge of how to "far exceed" and transfer that knowledge to the organization.

For each objective that was not attained, determine the reasons for

the deviation. Typically, the analysis consists of the detailed supporting data for all strategies associated with the objective, identifying what should have changed to have been more successful in the year just completed. This looking back and ahead to the future is the key to improving organizational learning. It can greatly benefit the program in identifying future opportunities.

The Annual Plan

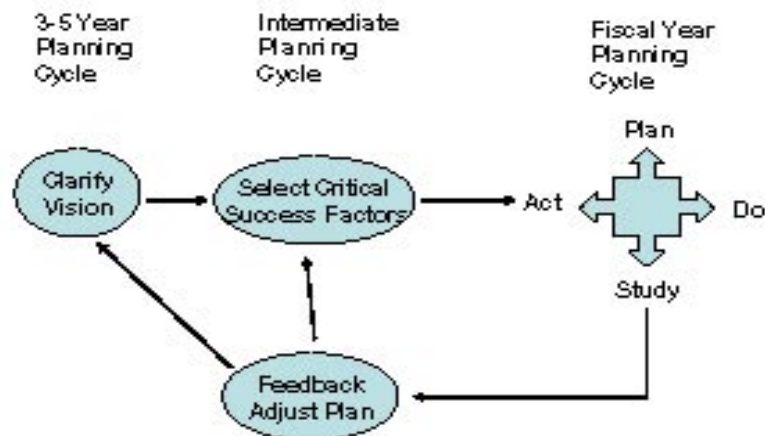
The annual plan documents what needs to be done this year, and it is not necessarily all that needs to be done. This is why a good Hoshin plan is fairly constant for a few years, with only minor modification to the strategies. Record the organization's objective and activities in the annual planning table (APT). At each level of administration, the APT from the next higher level is used to develop an APT for that level. Each group simply uses the strategy and strategic goal (or PPM) from above as its objective and goal. Each program or process owner selects the strategy most appropriate to the group's expertise or technical strengths. In this way, the critical issues filter down through the organization, with each level contributing where it appropriately and most effectively adds value. At each succeeding level, strategies are owned, expanded and turned into implementation plans that contribute to reaching the objective and the overall goal.

The following goal and bullet points are an example of an excerpt from Illinois State University's strategic plan. At the department level the Industrial Technology program establishes its own parallel goals as the basis for its strategic plan which must align with the university plan.

Goal 2. The national leader known for excellence in undergraduate and graduate education provides the premier undergraduate experience and demonstrates excellence in graduate education and research as evidenced by:

- Increasing retention and graduation rates
- Exceeding measures of involvement on the National Survey of Student Engagement
- Providing off-campus experiential learning and research opportunities for students
- Providing on- and off- campus graduate degree and certification programs serving working professionals
- Increasing support for library collections, course-integrated instruction, and reference services
- Increasing the percentage of faculty with graduate faculty status
- Increasing opportunities for faculty and staff professional development and support
- Delivering a nationally recognized first-year experience

Figure 1. The Hoshin Approach incorporating the PDSA cycle



- Increasing the number of students actively engaged in research and creative activities
- Increasing support for student, faculty, and staff publications and presentations (Educating Illinois: 2003-2010, p. ii)

An example of a small segment excerpted from an Industrial Technology department annual plan is included in figure 2. This figure illustrates how departmental goals, objectives, supporting activities, timelines, accountability, and resources are linked to broader college and university annual plans. Goal 1 in the following example was adapted from the University Strategic Goals for this particular Industrial Technology department.

This is the cascading attribute of the Hoshin planning process. It is a very im-

portant step in empowering the organization. As each succeeding level accepts its portion of the plan, it has been involved in the plan's development by adding detail where it can best contribute and add value. This is also how the organization buys into the plan; it now has some ownership of the plan itself. The Hoshin methodology is a strategic planning process with the built-in ability to empower or hold accountable the organization.

The Annual Planning Table

The APT lists the objective to be achieved as well as the goals. The APT also outlines the strategies to be used to achieve the objectives and indicates who will own each strategy. More importantly, the plan includes strategic goals and PPMs for every strategy. These PPMs are specific measures that monitor, guide or measure performance and progress of the strategies. In the

above example the PPMs were incorporated into the *Activities* descriptions. The PPMs should answer the question: "How will I know whether a strategy is being implemented successfully?" When appropriate, there could be multiple PPMs so that all important aspects of a strategy are measured. While planning generally cascades downward through the organization, coordination requires plans to be developed at each level in consultation with work groups above, below and laterally (intradepartmental or inter-process). For intradepartmental objectives, members from the involved processes must work together to resolve the PPMs. For such projects, intradepartmental responsibilities are defined and documented in the annual plan.

The decision of strategy ownership is usually based on who has the greatest interest, influence or ownership in

Figure 2. Sample excerpt from Industrial Technology Department Annual Plan.

I. GOAL: Provide a premier undergraduate education in Illinois in Industrial Technology. (con't.)

<i>OBJECTIVES</i>	<i>ACTIVITIES</i>	<i>ACCOUNTABILITY</i>	<i>TIME</i>	<i>RESOURCES</i>
f. Students will have opportunities to be involved in research on an independent or collaborative basis.	Provide research opportunities for undergraduate students with 10 \$250 research awards.	Faculty	Annually	\$2,500
g. Students from across the campus will have the opportunity to select courses from the department as part of their general education.	Review and revise proposals for new general education program.	Chair of Department Curriculum Committee	2004-2006	\$5,000
h. Increase retention and graduation rates.	Track midterm progress and grades for underclassmen and mentor students.	Chair, Faculty	Ongoing	n/a
i. Follow-up studies related to students obtaining employment and success on the job.	Follow-up studies will be completed yearly.	Assistant Chair	Ongoing	n/a
j. Increase the number of Undergraduate majors to 500 with 100 minors.	Target select High Schools and Community Colleges for increased recruiting campaigns.	Chair, Academic Advisors, Sequence Coordinators, and All Faculty	Ongoing	\$2,500/yr.
k. Conduct departmental self study in preparation for NAIT accreditation.	Assemble and generate data, implement department quality plan.	Chair, Assistant Chair, Sequence Coordinators, Faculty, University Administration	2004-2005	\$12,000

what must be changed. This plan details where the real process improvement or reengineering occurs. When strategy ownership is at the appropriate level within the organization, the strategy owner develops an implementation plan.

The Implementation Plan

The implementation plan as illustrated in Figure 3, is a detailed tactical or action plan that lists the precise responsibilities of everyone involved in implementing a particular strategy. It is usually laid out in a Gantt chart (or timeline) format, which identifies: how (with what measure), by whom and when. The implementation plan should include activities, timelines and checkpoints for specific events. The implementation plan is an ongoing decision-making tool; plot or note actual performance to plan alongside the planned events and checkpoints. The implementation plan should also include how and when the plan will be reviewed.

Developing an implementation plan usually requires coordination both within and between process owners. Implementation plans are not just the responsibility of the individual completing the lowest-level annual plan. Each level in the organization has detailed responsibilities to ensure support for and successful completion of the department's plans.

Periodic Hoshin Review Process

After the plan has been implemented beyond the first year, it is time to begin

the periodic Hoshin review process. This review should be conducted by department leadership. APT reviews need to be conducted as per the plan, at least once per semester. The review should begin with careful examination of the business fundamentals data. This data provides a snapshot, to gauge the department's overall progress towards achieving the PPMs. The department leadership should review the BFT items with faculty and staff on a regular basis. Because the BFT items were developed in cooperation with the process owners (faculty and staff), reviews of these items should give the department leadership a quick indication of how well the department is performing.

For the APT itself, conduct a review of the supporting strategies, their PPMs and progress toward the overall goal using the Hoshin review table. In some cases, the strategy owner and his or her team may be involved in these reviews. The final annual review is essentially a compilation and summary of the Hoshin review tables accumulated during the year. The strategy review's last step entails identifying the root causes of the deviation. In addition, the review should record the actions taken in response to this deviation. The actions may comprise as many as three phases:

- Emergency countermeasure to alleviate the immediate problem.
- Short-term fix to prevent the problem from recurring.
- Determination and removal of the problem's root cause. This is the permanent solution that will prevent the problem from recurring.

If, during the review process, new and unexpected developments arise or better ways are found for achieving PPMs, the plans should change accordingly. When this happens, document and highlight the reasons for the change on the review table. Once again, this helps the department learn from the plan and improve the planning process for the next year. The level of documentation inherent in the Hoshin approach to Department level strategic planning can be a valuable tool to help demonstrate departmental commitment to closing the program assessment loop.

Summary

The Hoshin planning process is a very effective strategic planning process that follows the PDCA improvement cycle. For Hoshin to succeed, the department must undergo an effective analysis from both a business fundamentals and strategic planning standpoint. These analyses provide input for the plan. In addition, recognize that breakthrough activities can only occur when the PPMs in the BFT are in control. The idea is to develop a complete plan to guide the department by identifying strategies with measures and owners.

Several steps are required to implement the plan. Detailed APTs at all levels provide guidance and linkage as well as drive the implementation plans. Assign clear responsibility for each item in the implementation plans. Significant improvements usually require both intra- and inter-process cooperation. When plans are developed in a cross-

Figure 3. Sample excerpt from a departmental implementation plan.

Activity	Activity Owner	Target by June 30	Actual at last Milestone	Review Cycle Timeline (1 st of each Month)							
				Jan	Feb	Mar	Apr	May	Jun	Jul	
Construction Mgmt	B*****	200	225								
Industrial Computer Systems	S*****	125	106								
Graphic Communications	W*****	60	41								
Integrated Manufacturing Systems	S*****	60	51								
Technology Education	D*****	60	72								

functional, cross-department and cross-process manner, extensive discussions within and between process owners are vital to the success of the overall plan. After the plans have been put in a final form and rolled out, continually monitor each strategy's progress using the established PPMs. Highlight any deviations from the plan on the review tables, which also record actions taken based on results. A strategy is completed when the strategic goal is obtained. Finally, summarize the PDCA cycle for the year in the annual review table. The Hoshin planning process helps a department learn from both problems and successes. This is fundamental to building a learning organization. Hoshin enables the department to collect and check performance information about itself from both day-to-day and long-term measures.

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