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AUTHOR Groff, Warren H.
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ABSTRACT

Elements of strategic planning are discussed in terms of their relevance for occupational education. Introductory remarks focus on the educational implications of the transformation from an industrial society to a technological society based on information. Two facets of strategic planning are discussed next: external assessment, which involves needs assessment, market analysis, environmental scanning, trend and policy analysis, and issues management; and internal audit, which involves the evaluation of programs on the basis of quality, centrality, and market viability. The next section assesses the sophistication of vocational-technical education with regard to collecting the kinds of data that are useful in strategic planning. The following section describes two recommendations: (1) the development of conceptual frameworks which would clarify the relationship between postsecondary education and the economy and (2) the clarification of the role of vocational-technical education in economic development. Finally, the paper presents a multi-year plan of action designed to synthesize research and development on selected topics, to assist institutions in planning strategically, and to reduce the lag time between research and development and its pilot application and dissemination. (LAL)

# STRATEGIC PLANNING AND MANAGEMENT FOR VOCATIONAL-TECHNICAL EDUCATION ON THE COMMUNITY COLLEGE LEVEL

1. What is strategic planning?
2. Where are we relative to strategic planning?
3. What could we do in strategic planning?

by

Warren H. Groff, Ed.D.
Vice President for Academic Affairs
North Central Technical College
Mansfield, Ohio 44901

presented at a
Special Hearing of the Board of Directors
American Vocational Association
Anaheim, California

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TABLE OF CONTENTS

# INTRODUCTION

> For the first time in history education is now engaged in preparing men for a type of society which does not yet exist. Educational action to prepare for work and active life should aim less at training young people to practice a given trade or profession than at equipping them to adapt themselves to a variety of jobs, at developing their capacities continuously, in order to keep pace with developing production methods and working conditions.
>
> This presents educational systems with a task which is all the more novel in that the function of education down the ages has usually been to reproduce the contemporary society and existing social relationship.... At a time when the mission of education should be to train "unknown children for an unknown world," the force of circumstances demands that educationists do some hard thinking, and that in so doing they shape the future.[1]

* * * * * * * * * * * * * * *

The history of the development of human society can be traced from the hunting society through the agricultural society to the industrial society. In the hunting society, mankind was concerned primarily with extracting things from nature. The transformation to the agricultural society was slow and based on rather simple technological innovation. The hunting and agriculture societies can be characterized as interactions between people and nature. In comparison, the transformation from the agricultural society to the industrial society occurred more quickly and was the result of technological advances in energy, transportation, communications, raw materials, and research and development networks. The industrial society can be characterized as interactions between people and goods or fabricated nature. More recently, advances in the industrial society have been the result of the integration of macro technological systems, the aggregation of complex technological developments in each of the above mentioned networks.

During recent years we have experienced the onset of a transformation to a new type of society. Masuda indicates:

> Mankind is now entering a period of transformation from an industrial society to an information society... man is now standing at the threshold of a period of innovation in a new societal technology based on the combination of computer and communications technology, quite unlike any of the past. Its substance is information, which is invisible. This new societal technology will bring about societal transformation which, in a double sense, is unprecedented.[2]

This transformation to the information society is concerned with the shift from physical productivity of material goods to information productivity and can be expected to bring about fundamental changes in human values, in trends of thought, and in the political and economic structures of society. This learning and information society will be characterized as interactions between people and ideas and knowledge.

The onset of a transformation to a new type of society is occurring at a time when illiteracy is a major problem in this nation. Numerous articles have been written in recent years about the growing number of functionally incompetent, scientific illiterate, and the growing illiteracy problem for business when employees lack reading and writing skills necessary for their work. An article in the Boston Sunday Globe indicated that it is scandalous that Johnny and Janie cannot write when they enter college "but it is perhaps less scandalous than the possibility that, when they emerge as bachelors of arts or science, they may be unable to describe either discipline in acceptable written English." The problem is compounded when to these forms of illiteracy are added (1) occupational illiteracy, (2) economic illiteracy, (3) research illiteracy, (4) management systems illiteracy, (5) information processing illiteracy, and (6) technologic illiteracy. Human resource development, the prevention of human obsolescence, is the biggest challenge to postsecondary education in the years ahead.

The onset of the high technology, information society has profound implications for occupational education and the mission priorities of instruction, research, and public service. Gollattscheck and others express the implications in terms of a new role for American postsecondary education. They state:

> We believe the time has come for a fourth major development in American postsecondary education: the creation of the community renewal college. The deterioration of our communities, the increasing inability of individuals to cope with rapid change, the obsolescence of individuals and social organizations, and the increasing number of citizens with educational needs who are beyond the purview of existing colleges demand a new kind of postsecondary institution. This new college must be committed to the improvement of all aspects of community life...[3]

The industrial nations of the world are in the turbulent times of a structural shift from an industrial society to a technological society based on information. Foreign competition, technological advances, changes in productivity, high costs of energy and raw materials, plant and human obsolescence, and infrastructure deterioration are causing dislocations in our economy. What is needed is extraordinary leadership on the part of professional educators and their associations to chart a course of action. This manuscript will (1) describe strategic planning, (2) discuss where we are relative to strategic planning, and (3) propose a plan of action that could be followed over the next three years to provide direction to our institutions and statewide systems of vocational-technical education to implement processes of strategic planning for economic development.

## What Is Strategic Planning?

External Assessment. During the post World War II years, mission priorities had a focus on acquiring resources and facilities for the increased number of students resulting from the equal right demand for access to postsecondary education and limited research to support selected purposes of the industrial society. Planning in postsecondary education during the 1960s was undertaken in response to immediate needs of the instruction and research mission priorities with minimum regard to the long-term future.

During the 1970s, the influx of traditional 18 to 22 year old students began to stabilize. Phenomenal growth occurred for a broad range of education and training providers including business and industry, the department of defense, professional associations, adult education associations, and proprietary organizations. Research and development underwent significant change. Various reports document the rapid deterioration and growing obsolescence of laboratory equipment, the aging of research faculty and lower morale of junior faculty, and the shift toward "socially relevant research" and defensive R and D with 2 to 3 year payoffs leaving much of the large scale "industrialized" basic research to the government.

Organizations began to experience the impact of a broad range of demographic, social, economic, and political forces. As a result, organizations such as the life insurance industry, The Council of Independent Colleges (formerly The Council for the Advancement of Small Colleges), the Academy for Educational Development, and the American Association of State Colleges and Universities launched programs on comprehensive planning. These projects, and others like them, all stressed the need to assess the external environment. The literature began to reflect descriptions of institutional planning processes including some way to assess the external environment.[4]

For example, the Institute of Life Insurance in 1967 conducted a Future Outlook Study to assess significant social and political trends because it became clear that

reactive styles were not appropriate in times of rapid change. One result of the Future Outlook Study was a call for an ongoing mechanism to be established by which the the insurance industry could keep abreast of emerging ideas and social changes that might impact on its operating environment. In 1970, an early-warning system called the Trend Analysis Program (TAP) was designed and put into place. TAP continues to operate as a program of the American Council of Life Insurance which was formed in 1976 by a merger of the Institute of Life Insurance and the American Life Insurance Association. TAP is useful as a model in terms of the screening and analysis function as well as the products which are produced.

A project by the American Association of State Colleges and Universities uses a cross-influence matrix of 12 societal trends and 12 values to bring planning assumptions into fucus before setting goals in 10 areas. The 12 social trends are population, government, global affairs, environment, energy, economy, science and technology, human settlements, work, life style, women and participation. The 12 societal values are change, freedom, equality, leisure, interdependence, pluralism, localism, ethics, knowledge, quality, goals, and foresight. The 10 goal areas are finance, students, research and development, public service, facilities, faculty, curricula, administration, resources, and athletics.

A project by the Academy for Educational Development used the categories of demographic trends, social expectations, economic trends, and governmental planning. Information analyzed by the Bureau of the Census includes social indicators such as population and the family; health and nutrition; housing and the environment; transportation; public safety; education and training; work; social security and welfare; income and productivity; social participation; culture, leisure, and use of time. Economic trends could be listed by industry such as electronics, telecommunications, biotechnology, textiles, auto, shipbuilding, mining, health care, insurance, education, agriculture, and airlines. Categories of data about the external investment can include

any of the above-mentioned items. Sample subcategories of demographic, economic and social data are displayed in FIGURE 1.

Tools for assessing the external environment include (1) needs assessment, (2) market analysis, (3) environmental scanning, (4) trend analysis, (5) policy analysis, and (6) issues management. Needs assessment is a generic term to describe a process for determining the discrepancy between existing and desired levels of attainment with respect to specific educational goals. Market analysis consists of obtaining detailed information about markets or market segments served or unserved by an institution or system. Market analysis is an organized effort to identify the relationship between specific wants and needs of people and the ways institutions meet or could meet them through a coherent plan of research, strategy, and communication. Environmental scanning consists of a sampling of data to achieve a well-defined set of objectives. Trend analysis consists of the systematic review of comparable data over time to determine direction. Policy analysis is the systematic analysis of data to determine the impact on policy. Issues management is the systematic management of issues through four stages: formative stage, legislative stage, executive stage, and judicial stage.

Internal Audit. Another element of strategic planning is the audit of the internal environment. An institution or system can be viewed as being comprised of several functional areas such as (1) planning, research, and evaluation; (2) enrollment, retention, and financial aid; (3) primary certificate, degree and diploma programs; (4) support programs; (5) personal management and development; (6) fiscal resources development and management; and (7) reporting and outcomes analysis. Each of these areas is an aggregate of activities and functions which can be listed in a manner as displayed in FIGURE 2. By adding scale and specific criteria, an institution can audit its strengths and weaknesses. Programs can be evaluated objectively on the basis of quality, centrality, and market viability. Quality is a function of faculty, students, library holdings, support services, program characteristics, program advisory committees, and

FIGURE 1

SAMPLE SUB-CATEGORIES FOR SUGGESTED DATA CATEGORIES

| EXTERNAL ENVIRONMENT | | |
|---|---|---|
| DEMOGRAPHIC CHARACTERISTICS | ECONOMIC TRENDS | SOCIAL INDICATORS |
| Population Size | Textile Industry | Population & The Family |
| Age Distribution | Auto Industry | Health & Nutrition |
| Sex Ratio | Electronics Industry | Housing & The Environment |
| Marital Status | Telecommunications Industry | Transportation |
| Ethnic and Cultural Characteristics | Health Care Industry | Public Safety |
| Education Levels | Agriculture Industry | Education & Training |
| Economic Status | Airline Industry | Work |
| Population Density | Energy Industry | Social Security & Welfare |
| Degree of Urbanization | Steel Industry | Income & Productivity |
| Racial Composition | Insurance Industry | Social Participation |
| Unemployment | Shipbuilding Industry | Culture, Leisure & Use of Time |
| Poverty & Deprivation | Biotechnology Industry | |
| Illiteracy | Aerospace/Space Industry | |
| Existence of Basic Community Services | Defense Industry | |
| Social, Political, Economic Well Being | Synfuel Industry | |
| | Mining Industry | |
| | Education Industry | |

FIGURE 2

EVALUATION FORMAT FOR

DIAGNOSING STAGE OF INSTITUTIONAL DEVELOPMENT

| | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|
| **I. Planning, Research and Evaluation** | | | | | | |
| 1. External Environment | | | | | | |
| a. Needs Assessment | | | | | | |
| b. Market Analysis | | | | | | |
| c. Trend Analysis | | | | | | |
| d. Environmental Scanning | | | | | | |
| 2. Planning Process | | | | | | |
| a. Institutional Goals | | | | | | |
| b. Specific Objectives | | | | | | |
| 3. Institutional Research | | | | | | |
| 4. Management Information System | | | | | | |
| 5. Institutional Self-Study | | | | | | |
| 6. Annual Evaluation Process | | | | | | |
| **II. Enrollment, Retention, and Financial Aid** | | | | | | |
| 1. Manual of operations for admissions | | | | | | |
| 2. Inquiry System | | | | | | |
| 3. Marketing plan | | | | | | |
| 4. Communication tools | | | | | | |
| 5. Professional development | | | | | | |
| 6. Faculty understanding | | | | | | |
| 7. Manual of operations for financial aid | | | | | | |
| 8. Enrollment projections | | | | | | |
| **III. Primary Programs (Certificate and Degree Programs)** | | | | | | |
| 1. Accounting | | | | | | |
| 2. Business Management | | | | | | |
| 3. Data Processing | | | | | | |
| 4. Drafting and Design | | | | | | |
| 5. Electronic Engineering | | | | | | |
| 6. Industrial Management | | | | | | |
| 7. Law Enforcement | | | | | | |
| 8. Mechanical Engineering | | | | | | |
| 9. Mental Health and Retardation | | | | | | |
| 10. Nursing (R.N.) | | | | | | |
| 11. Practical Nursing | | | | | | |
| 12. Radiologic Technology | | | | | | |
| 13. Respiratory Therapy | | | | | | |
| 14. Retail Management | | | | | | |
| 15. Sales and Marketing | | | | | | |
| 16. Secretarial Science | | | | | | |
| 17. Therapeutic Recreation | | | | | | |

| | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|
| **IV. Support Programs** | | | | | | |
| 1. Counseling services | | | | | | |
| 2. Student records | | | | | | |
| 3. Placement | | | | | | |
| 4. Educational Enrichment Laboratory | | | | | | |
| 5. Learning Resources Center | | | | | | |
| 6. Physical Activities Center | | | | | | |
| 7. Student activities | | | | | | |
| 8. Community Educational Services | | | | | | |
| **V. Personnel Management and Development** | | | | | | |
| 1. Policies/practices | | | | | | |
| 2. Institution organization | | | | | | |
| 3. Professional development | | | | | | |
| 4. Management development | | | | | | |
| 5. Interpersonal skills | | | | | | |
| 6. Sense of community | | | | | | |
| 7. Staff management | | | | | | |
| 8. Institutional advisory committees | | | | | | |
| **VI. Fiscal Resources Management and Development** | | | | | | |
| 1. Cash flow analysis | | | | | | |
| 2. Budget planning systems | | | | | | |
| 3. Budget control | | | | | | |
| 4. Donor cultivation | | | | | | |
| 5. Planning college revenues | | | | | | |
| 6. Gift record keeping system | | | | | | |
| 7. Cost effectiveness | | | | | | |
| 8. Proposal development/grants administration | | | | | | |
| **VII. Reporting and Outcomes Analysis** | | | | | | |
| 1. Internal communications mechanisms | | | | | | |
| 2. External communications mechanisms | | | | | | |
| 3. Output analysis system | | | | | | |
| 4. Impact analysis system | | | | | | |

KEY:

5 Outstanding, far exceeds reasonable expectations
4 Good, generally exceeds reasonable expectations
3 Satisfactory
2 Doubtful, generally falls short of reasonable expectations
1 Unsatisfactory, totally inadequate
0 Non-existent

other variables. Market viability is defined as demand in the marketplace, competition, and comparative advantage. The external environment assessment provides insights into dimensions of market viability. A college or system can evaluate the quality of its programs on the basis of these criteria and divide them into three equal groups labeled high, medium, and low in quality, centrality, and market viability.[5]

Strategic Options and Tactical Alternatives. The purpose of the collecting and analyzing variables outside the institution or system is to identify opportunities and threats in the external environment. The purpose of the audit is to identify strengths and weaknesses of the internal environment. The intent is to develop a most likely vision or scenario from among the several alternative futures, a plan of action to capitalize on strengths, minimize weaknesses, take advantage of opportunities, and eliminate or reduce threats.

Bowen indicates strategic options are (1) redirect resources toward higher quality, (2) redirect resources toward research and public service, (3) redirect resources toward new student clientele, and (4) retrenchment.[6] Tactical alternatives under redirect resources toward higher quality include (1) improving diagnostic services - aptitude and skill testing, career life planning counseling, and learning styles/hemisphericity diagnosis; (2) improving content - within and between disciplines, issues specification, and values clarification; (3) improving the delivery system and teaching methodology through individualization and electronic delivery of programs and services; (4) improving evaluation methodology - articulation agreements, competency-based format, and academic credit for experiential learning; and (5) improving outcomes follow-up - output of the program and longitudinal study of impact. Tactical alternatives under redirect resources toward public service include (1) small business development assistance, (2) economic development and revitalization, (3) technology transfer, (4) "Building Better Boards," (5) issues and values clarification, (6) strategic planning for business and industry, (7) community and state goal setting projects, and (8) community leadership development.

## Where Are We Relative To Strategic Planning?

Although numerous persons have written about strategic planning, no research exists that will provide us with a definitive statement about the stage of development of vocational-technical education with regard to sophistication in strategic planning. One doctoral dissertation completed at the Ohio State University in 1980 described the characteristics of exemplary planning systems in 33 two-year colleges.[7] The study is limited to a few exemplary planning systems and does not provide detailed information about assessing the external environment, auditing internal strengths and weaknesses, and developing a vision which would lead to strategic options and tactical alternatives. It is not possible to generalize about our degree of sophistication from the research evidence.

A statement Gene Bottoms delivered in 1980 to the House Subcommittee on Elementary, Secondary, and Vocational Education listed the following institutions in the delivery system:[8]

| | | |
|---|---|---|
| General High School | Less than 5 programs | 10,851 |
| Comprehensive High School | 5 or more programs | 4,878 |
| Vocational High School | | 225 |
| Area Vocational Center | | 1,395 |
| Community College | | 720 |
| Technical Institute | | 162 |
| Area Vocational School | | 504 |
| Specialized Noncollegiate Postsecondary School | | 308 |

There simply is no easy way to generalize about such a diverse delivery system's stage of development as it relates to strategic planning.

One way to identify stage of development or evolution is to examine categories of data about the external environment that would be useful in strategic planning and determine where we are in the collection, analysis, and use of data in planning and decision making. Aggregate categories of data about the external environment include (1) demographic trends, (2) economic trends, (3) social indicators, (4) governmental planning, (5) technological advances, (6) changes in the workplace, (7) energy

requirements, and (8) value shifts. Many of our institutions and systems are probably doing a reasonably good job in the collection and analysis of demographic data. Workshops on market analysis have increased in number and complexity and assisted our institutions and systems to use this tool in strategic planning.

An example using demographic and other data will demonstrate their strategic importance. For example, the number of high school graduates between 1979 and 1995 will vary from a decrease of almost 60% in Washington, D.C., to an increase of almost 60% in Utah. Eleven states will experience a decline of more than 30% in the number of high school graduates during that span of time. If we begin to add other variables, we can begin to recognize that different contexts will require different responses. To illustrate, one of four white Americans is young, while one of three black Americans and one of two Hispanic Americans is young. Another important statistic is the fact that 38% of white American families have school age children while 66% of Hispanic American families have school age children. These statistics are U.S. averages and do not reflect geographic variations. In addition, a recent study by the Center for Public Resources indicates that 13% of white, 43% of black and 56% of Hispanic 17 year olds are functionally illiterate and that between 40% and 50% of all in urban areas have serious reading problems.[9] These issues will become more important as this nation moves to the information society including operationalizing the office of the future, the automated factory, and the electronic college.

Beyond demographic trends, however, little evidence exists to suggest that our delivery system is very sophisticated in the systematic collection and analysis of other categories of data about their external environment. This statement is based on having assisted in the large scale projects listed on page 4 of this statement and the above stated doctoral dissertation, having conducted numerous seminars and workshops on strategic planning and management, having read Higher Education Act Title III proposals for a number of years, and having assisted several institutions develop comprehensive

planning processes. For example, as dramatic as the explosion in high technology appears today, it is not a sudden, isolated happening. Rather, the explosion is the cumulative effect of the application of integrating increasing complex technology from a variety of fields which have been evolving at an ever increasing pace for the past thirty years. Telematics is the integration of telecommunications, computers, and information technologies. This phenomena will accelerate at an international scale in the immediate future as we try to regain world supremacy in technology among industrial nations. Postsecondary education must develop a strategic planning capability if it is to assist in the economic revitalization of this nation in this unprecedented battle.

The second component of strategic planning consists of an audit of the internal environment. Again, I know of no definitive research on the topic of conducting an institutional audit. Comprehensive institutional audit and program review protocols exist and are becoming increasingly available as are policies relating to reduction in force. The average growth in full-time equivalent enrollment for all sectors of higher education between 1970-71 and 1977-78 was 26.69%. The average increase for universities was 7.76%, for four-colleges it was 19.17%, and for two-year colleges it was 35.05%.[9] The American Association of Community and Junior Colleges indicates that enrollment in two-year colleges grew from a little more than 1/2 million persons at 678 institutions in 1960 to 4 1/2 million persons in 1,234 two-year campuses including 78 multi-campus districts, 187 private two-year colleges, and approximately 90 two-year branches of four-year colleges and universities.[10] As the newest kid on the higher education block, postsecondary vocational-technical education has been preoccupied with its adolescent quantitative growth spurt.

In the absence of sophisticated systems for the collection and analysis of data about our external and internal environments, I conclude that vocational-technical education is in the early stages of development as it relates to strategic planning and management.

Although not much may be known about stage of development in strategic planning and management for the entire vocational-technical education delivery system, several points should be emphasized. First, the private colleges and regional universities saw the need for a different form of planning long before the two-year college became interested in strategic planning. We can learn a great deal from the series of projects conducted by the Council of Independent Colleges, the Academy for Educational Development, the American Association of State Colleges and Universities and our friends in business and industry who have developed methods for detecting early warning signals and translating them into a plan of action. A Futuristics Handbook was one CIC production in 1975. The director of the AED project named the Ohio University Environment Statements and Educational Plan, 1977-1987, as one of the best of sixty participating institutions. Appalachian State University used the AASCU A Futures Creating Paradigm to obtain reaffirmation of accreditation from The Southern Association of Colleges and Schools in 1981. The State Uniersity of New York Centers at Albany and Binghamton and the University of Delaware used their planning processes for reaffirmation of accreditation from the Middle States Association of Colleges as the Wiliamsport Area Community College is doing this year.

A second point that needs to be stated relates to organizing for strategic planning. Strategic planning consists of a structural component as well as a human resource development component. Excellent examples exist of both components including the high technology Delphi study of Owens Technical College and the high technology planning process at Pima Community College. The key is to recognize the need for dealing with both components in the early "plan to plan" stage of development so that the strategic planning and management results in organizational development and renewal.

Can we learn something from the research about organizational development? Research indicates that all organizations pass through various stages of growth and development. Greiner describes five stages each with its own management style to achieve growth (1)

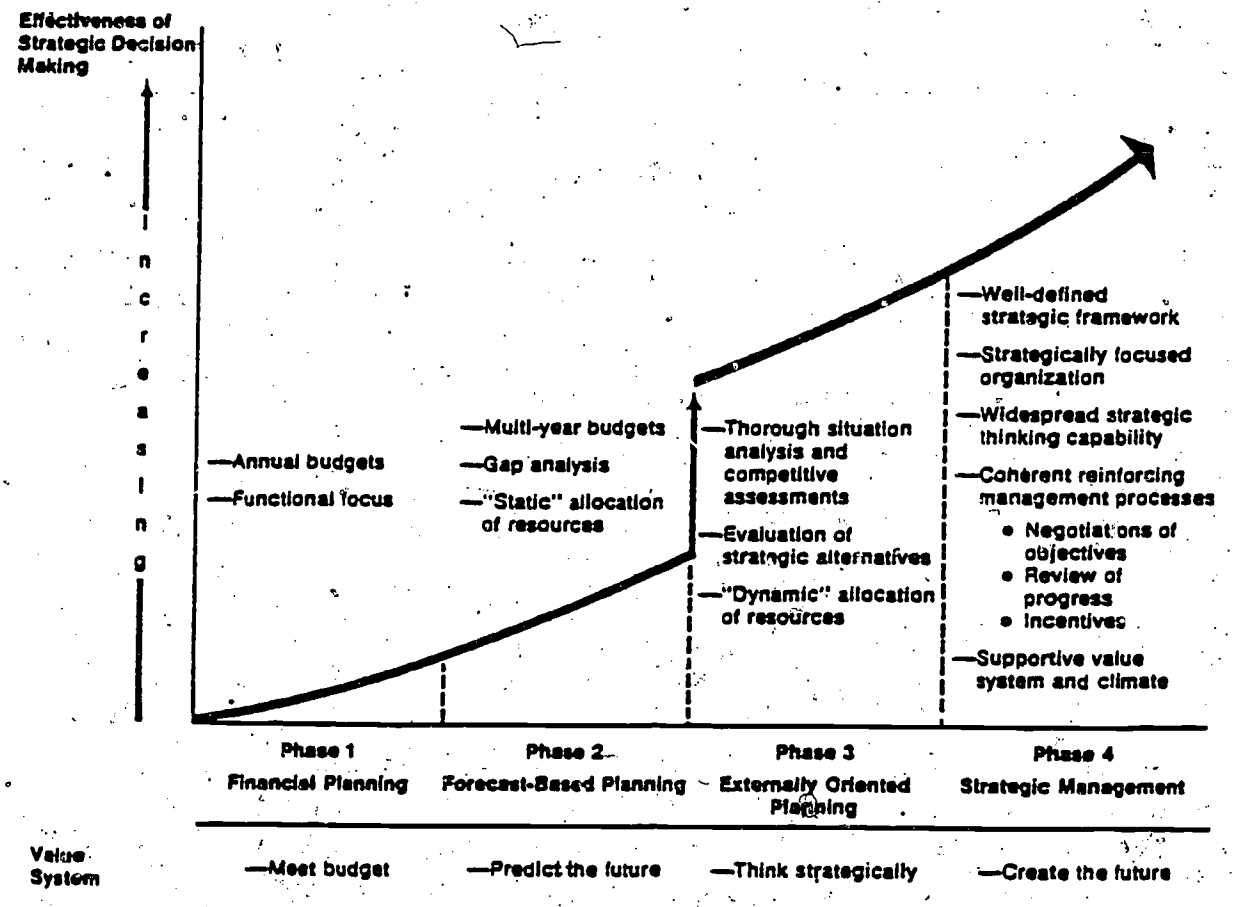
creativity, (2) direction, (3) delegation, (4) coordination, and (5) collaboration.[11] Between each stage a particular crisis is posited, thus requiring a style change. These crises involve first leadership, then autonomy, then control, and finally a participative style of mutual goal setting through a matrix of teams. James has a somewhat different concept of the organizational life cycle by focusing more on the problems faced at each phase of evolution; his five stages include (1) emergence, (2) growth, (3) maturity, (4) regeneration, and (5) decline.[11] The concept of stages of corporate development for computer/data processing activities has been described by Nolan (1979) as (1) initiation, (2) contagion, (3) control, (4) integration, (5) data administration, and (6) maturity.[13] The phases of evolution leading to corporate strategic decision making have been described as (1) financial planning - meet the budget, (2) forecast-based planning - predict the future, (3) externally oriented planning - think strategically, and (4) strategic management - create the future.[14] (See FIGURE 3)

It is becoming increasingly clear that the strategies an organization uses are influenced by its position in a developmental sequence. All of the models emphasize the style and strategy changes associated with these changes. Organizations at different stages of evolution tend to elicit different managerial and organizational styles. This will often mean that those who led the organization at one stage may not be able to do so effectively at another. In the first stage an organization requires a single guiding executive who basically operates a "one-person show." Such executives tend to be rather authoritarian, to emphasize short-term thinking, and to have an operating orientation. In the second stage a group of managers with functionally specialized responsibilities replaces the single authoritarian executive. Thus, the chief executive must be able to work with members of the management team and utilize their talents effectively. The move to other stages is accompanied by a divisionalized structure with loose control over the operating units while stressing long-term strategic planning.

Implications of this research are incorporated in the plan of action suggested in the next section of this document.

FIGURE 3

**Phases in the Evolution of Strategic Decision Making**




Source: Frederick Gluck et al (1982) "The Four Phases of Strategic Management" The Journal of Business Strategy.

## What Could We Do In Strategic Planning?

Much of what I am going to recommend in the pages that follow is a result of direct involvement in large scale projects dating back to the late 1960s while serving as an Assistant Dean in the College of Education at Temple University, to large scale projects referred to in this document, and to having directed numerous workshops including the week-long Snowmass Institute on Strategic Planning and Management. As a participant in writing a proposal to help create a USOE regional educational laboratory in 1966 and later consulting with it in 1970, I had direct experience in the continuum extending from research and development through its dissemination in the educational industry. It is surprising that so few vocational-technical educators know about the R and D Centers, the REL's, ERIC (Educational Resource Information Centers), and other tools that could contribute to improving our educational industry.

No experience, however, has been more rewarding than the opportunity to chair the statewide Task Force on High Technology for the Chancellor of the Ohio Board of Regents beginning in the Fall of 1982. A group of 14 two-year college instructional officers met regularly in order to recommend a course of action for high technology in Ohio. After spending some time on defining the problem, the Task Force focused its discussion on (1) the development of a perspective of a future scenario for Ohio; (2) human resource development of providers and consumers of postsecondary education services; (3) equipment and capital expenditures; and (4) implications for program development, approval, and evaluation. The Task Force shared ideas, exchanged information, critically evaluated institutional and system models from other states. Nine packets of information were distributed to all persons. That material, however, represented but a fraction of the information accumulated by the project. Some of these ideas are documented in detail in Working Paper #1, a volume that became the raw material for Report #1 containing 11 recommendations listed under the headings of (1) scenario and role, (2) human resource development, (3) capital planning, and (4) program development and review.

What could or should the American Vocation Association do in strategic planning? That question is no less complex than attempting to account for all the variables associated with large scale efforts such as the "Little Boy Manhattan Project," the ten-year period of landing a man on the moon and returning him safely to earth, or the Columbia and Challenger expeditions.

The first, and foremost, challenge facing us is **intellectual capital formation.** At the outset, it is important to define intellectual capital formation as opposed to human resource development. If our vocational-technical education system is to be dedicated to economic development, we must develop conceptual frameworks or visions and images that clarify the relationship that postsecondary education is to have to the economy and then design the human resource components to move in the direction of preferred scenarios. The first, intellectual capital formation, relates to "ends," and the second, human resource development, relates to "means."

One element of intellectual capital formation is the clarification of conceptual frameworks such as (1) "The Office of Tomorrow" or "The Paperless Office", (2) "The Automated Factory" or "The Factory of the Future," (3) "Tomorrow House" or "The Computer Home", (4) "School of the Future" or "The Electronic College," and (5) "Cities of the 21st Century." Elements of "The Office of Tomorrow" or "The Paperless Office" include (1) word processing, (2) personal computers, (3) electronic mail, (4) computer assisted retrieval, (5) computer output microfilm, (6) facsimile devices, (7) telecomferencing, and (8) reprographics. "The Factory of the Future" includes automation through Computer Aided Design (CAD), Computer Aided Engineering (CAE), Computer Aided Manufacturing (CAM), Group Technology, Manufacturing Planning and Control systems; Automated Materials Handling, Materials Requirements Planning (MRP), scheduling approaches such as Automated Time Standards (ATS), Computer Assisted Process Planning, and Manufacturing Resources Planning (MRPII). When these technological advances are combined in an effort to move toward the "Factory of the Future," the combination is referred to as Computer Integrated Manufacturing or Integrated Computer Aided Manufacturing.

The reasons for clarification of conceptual frameworks are several. First, if vocational-technical education programs are to be responsive to the needs of their service area, they must reflect various levels of technological sophistication of that service area. This concept of appropriate technology is most important in assisting small corporations in the area. Second, few institution or systems have the human or capital resources to throw on line immediately a paperless office or a fully integrated factory as a replication of the real world of work. Our institutions advance in increments of growth or stages of development much like other organizations of society. What is important is to envision appropriate conceptual frameworks and translate them into multi-year sets of specifications so that the increments of growth are related to educational objectives for institutions and statewide systems.

Let me describe an interesting situation that illustrates the point. On January 26, 1982, the President's Cabinet and Academic Council at North Central Technical College held a discussion on strategic goal areas as a prelude to making capital purchases of $2M worth of equipment. The strategic goal areas were as follows:

I. Information Processing
   - A. Computer Literacy
   - B. The Office of the Future or The Paperless Office

II. Electronic Delivery of Educational Programs and Services
   - A. Interactive Diagnostic and Instructional Systems
   - B. Telecommunications and Teleconferencing Systems

III. High Technology
   - A. Advanced Machine Tool Design
   - B. Microelectronics
   - C. Robotics
   - D. Lightwave Circuit Technology

North Central Technical College now has more mainframe and distributive data processing equipment than most institutions, including state universities, in Ohio. I currently

serve on an Ohio Board of Regents Computer Task Force. Should the OBR Computer Task Force point to NCTC as a model of excellence to be replicated throughout Ohio or should the state make a commitment to a lifelong learning system that integrates telecommunications, computers, and information technologies? What is central to the discussion is the set of educational objective that is to be accomplished. The educational objective of access was accomplished through the massive construction of the two-year college system. The two-year college system, for the most part, took the form of traditional schooling and a configuration of plants tactically located within easy commuting distance of the masses of population.

Has our educational system kept pace with the needs of the learning society? Davies and Dougherty indicate that in the single recession year of 1975 this nation's 7,500 largest private employers spent over $2 billion on employee education or as much as the recent annual totals of all contributions from all sources to colleges and universities.[16] Luxenberg states, "The American Telephone and Telegraph company spent $700 million on educational programs for its employees, or more than three times the $213 million annual budget of the Massachusetts Institute of Technology."[17] Kost states, "Industry spends on employee education more than six times the amount appropriated by all the states for all of higher education."[18] An article entitled "Business Is Cutting In the Market" in The New York Times states, "Within a short drive of Boston, a city with no shortage of higher education, are four new degree-granting programs that are not even affiliated with a college or university. They are sponsored by a hospital, a bank, a consulting firm, and a computer manufacturer."[19] In addition, Maxwell indicates that traditional higher education is losing its monopoly on continuing education.[20] Several other persons identify 14 corporate colleges with degree granting authority which is the logical extension of a sophisticated corporate education and training capacity.[21]

Clearly what is needed is extraordinary leadership on the part of professional educators to dedicate their associations to intellectual capital formation, to design and

engineer the educational system necessary to develop and sustain the technical society based on information.

This decussion would not be complete without some reference to excellence. When Sputnik I and II were launched on October 4 and November 3 of 1957, the education industry was criticized for failure to develop the critical mass of mathematics and scientific infrastructure to compete with the USSR. This nation launched one of the largest battery of projects to redesign mathematics and science by calling upon the expertise of mathematicians, physicists and other scientists. We learned a great deal about how to teach better mathematics but not about how to teach mathematics better. The Sputniks have come back to challenge us again in the form of user-friendly fifth generation computers and the need for economic development and economic revitalization on an international scale. The storm of criticism is evident in such reports as A Nation At Risk (The National Commission on Excellence in Education), Action for Excellence (Task Force on Education for Economic Growth), Educating Americans For the 21st Century (National Science Foundation), High School: A Report on Secondary Education in America (The Carnegie Foundation for the Advancement of Teaching), and A Study of Schooling (John I. Goodlad).

If we have learned a lesson from the experiment of the Sputnik era, it is that we must go beyond teaching better mathematics and science to (1) knowing how to teach math and science better and (2) how to relate math and science to the world of work which includes the new or "high" technologies. The academic professions must interpret these two statements generically. The division of labor, hierarchial structural, principles of standardization, and the metallic character of the factory were incorporated into almost all major institutions of the industrial society. Schools and colleges were designed primarily like broadcast television--education and training services were delivered in uniform packages in a manner and at a time convenient to the provider. The challenge to the academic professions in the information society is to redesign the education and

training delivery system so that it is user controlled, relevant, state-of-the-art, magazine styled programming that the consumer can use when it is needed, as often as needed, and to see any part of the sequence. It should be based on the latest in brain research about how humans learn at various stages of development.

The second challenge facing us is the need to clarify the **role of vocational-technical education in economic development.** Let us begin by examining a number of facts. These are not new, nor are they all encompassing. They are a sample of items that represent the reality in which we operate.

1. 74% of all the markets lie outside the United States.
2. 1 out of every 4 manufacturing jobs now depends on foreign markets.
3. The Fortune 500 industries have not created a net new job in the last decade.
4. 80% of the new jobs are created by establishments with 20 or fewer employees and no more than 4 years of age.
5. In 1982, 25,346 businesses went bankrupt, the most since the great depression, but 566,942 new companies opened their doors.
6. 80% of productivity growth in U.S. business and industry since 1929 is attributable to human factors.
7. 1 in 5 persons is functionally illiterate.
8. For the first time in history, the educational skills of the current generation will not even approach, let alone equal or surpass, those of their parents.
9. Of the 10 categories of jobs the Department of Labor predicts will grow most in the next decade, not a single one is "high tech."
10. High tech industry will create less than 10% of new jobs.
11. 90% of the present workforce will still be working in 1990 and 75% of the present workforce will be working in the year 2000.
12. There is an undeniable relationship between research and development, technological advances and jobs, and economic development to be the focus on attracting, retaining, or expanding business and industry.

The energy and resources dedicated to projects attempting to promote economic development appear endless. Information is pouring out of the educational R & D centers, the 200 R & D laboratories and centers representing 11 agencies in the Federal Laboratory

Consortium, the Office of Technology Assessment of the United States Congress, the Congressional Clearinghouse of the Future, and the National Training Information Services. A Task Force on Technological Innovation of the National Governor's Association gathered information that indicated 32 states had launched projects on this topic.[22] Projects examined by the Task Force on High Technology included (1) the advanced technologies "Ben Franklin Partnership" program and the "Pennsylvania Research Inventory Project," (2) the Development of High Technology Industries in New York State, (3) the assessment of education needs of high technology industries in the Binghamton area, (4) An Advanced Technology Study for Post-Secondary Area Vocational-Technical Schools in Georgia, (5) the computer literacy project in Connecticut, (6) the "Massachusetts Small Business Advancement and Identification Program" and many others.

Laudable and interesting as these projects are, we appear to be in the early stages of development of a search for the role of vocational-technical education in economic development, in a new relationship between our institutions and the economy. In the past, vocational-technical education saw its relationship to the economy primarily in terms of providing a trained workforce. Although this focus will continue to be important in the future, new and expanded relationships are beginning to emerge as was noted in the list of tactical alternatives under the strategic option of redirecting resources to research and public service.

The transition of this nation's economy from the industrial society to a technical society based on information and all the forces that accompany that transition is mandating that we develop better systems to plan and manage the educational industry. What is needed is a multi-year plan of action (1) to synthesize R & D on selected topics; (2) to assist institutions and systems to plan strategically; and (3) to reduce the lag between R & D, its pilot application, and full dissemination.

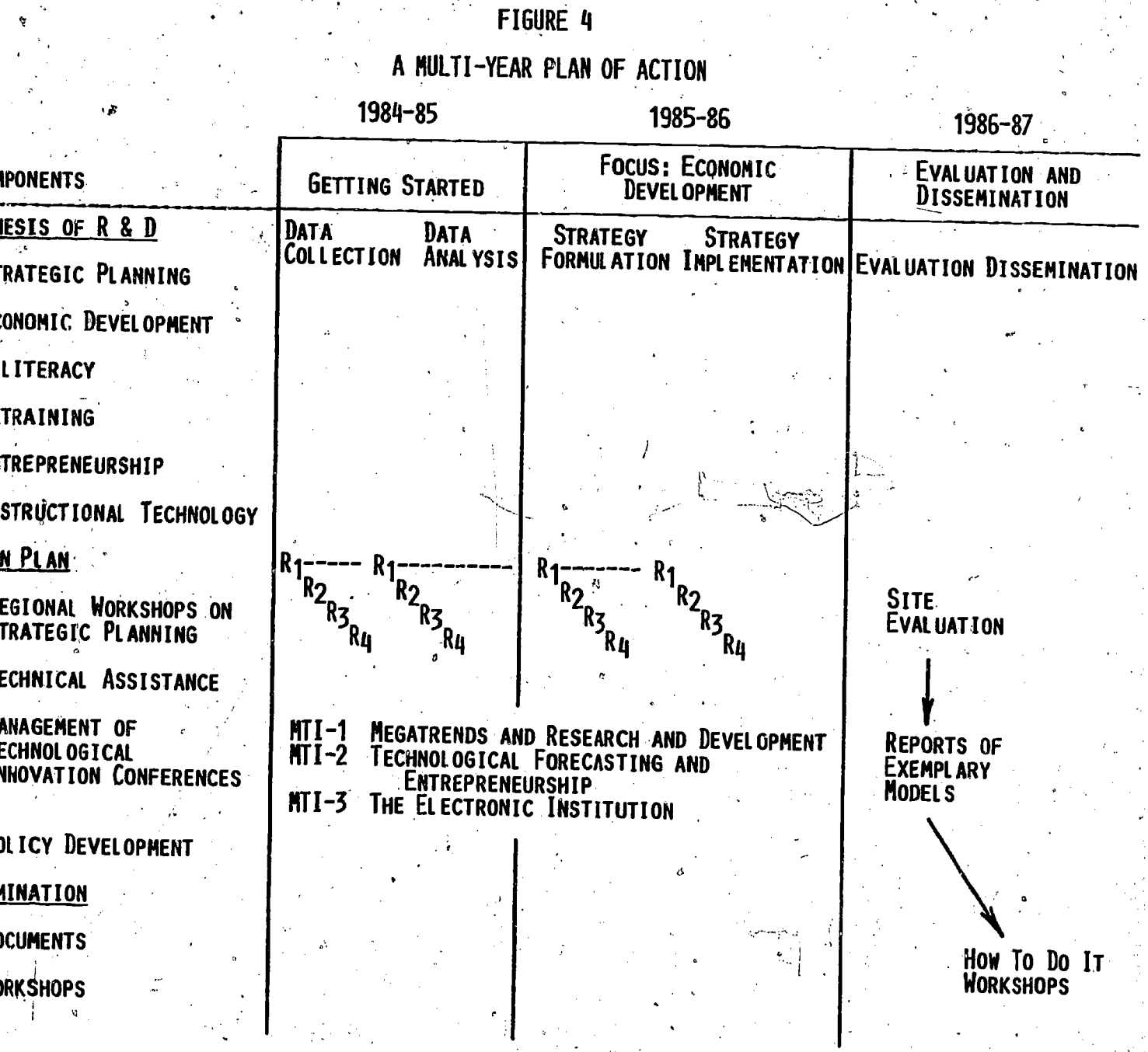
The times call for extraordinary leadership on the part of educators and their associations, a corporate amalgamation to produce a fifth generation user-friendly education and training system appropriate to the needs of the lifelong learning society and to the challenge of economic development, however that mission priority is defined. Consistent with the analogy to the fifth generation user-friendly computer, the American Vocational Association should join forces with the American Association of Community and Junior Colleges, the Association of Community College Trustees, the American Association of School Administrators, the National Center for Research in Vocational Education, and the United States Office of Vocational and Adult Education to launch a multi-year "Apollo" program on "Strategic Planning for Economic Development." The plan is a "Global Stakes" Morrill Act approach to implement a high-technology vocational-technical education system.[23] Although I recognize that a qualitatively superior multi-year plan of action would be the first charge to a blue ribbon committee which would provide overall direction to the project, I have given more than casual thought to this idea and shall broad-stroke parts of the design for you at this time.

The multi-year plan of action contains three major components: (1) a synthesis of research and development on selected topics, (2) an action plan for participants from institutions and systems, and (3) a dissemination component. (See FIGURE 4) Synthesis of R & D would focus on pulling together basic research on selected topics and the interpretation of research into practical application, pilot testing of this information, and the evaluation and dissemination of results. Selected topics would include (1) strategic planning, (2) economic development, (3) illiteracy, (4) retraining, (5) entrepreneurship, and (6) instructional technology.

The action plan for participants from institutions and systems would include (1) regional workshops on strategic planning, (2) technical assistance, (3) a "Management of Technological Innovation" conference series, and (4) policy development. The United States could be divided into 4 regions for a series of workshops on strategic planning.

FIGURE 4

A MULTI-YEAR PLAN OF ACTION



Information gathered in the synthesis of R & D component would be used during the "getting started" year 1984-85. During the fall, regional workshops would deal with the concept of strategic planning, how to start the process of strategic planning, and how to collect and array data relative to economic development. During the late winter and early spring the regional workshops would focus on data analysis. During 1985-86 the regional workshops would focus on strategy formulation and strategy implementation. Technical assistance would be provided to participating institutions and systems. A "Management of Technological Innovation" conference series, modeled somewhat after the Harvard Business School program, would be conducted to promote thought in selected areas. A policy component would serve as a clearinghouse for policies developed on topics within the scope of the project; an example of such a policy is the Human Resource Investment Policy developed by the Washington State Employment and Training Council.

A third major component has a focus on dissemination. The synthesis or R & D, the MTI conferences, and the strategic planning models developed by institutions and systems will be documented and shared with interested persons. In addition, the project evaluation will include site visitations of exemplary models which will be described in case study reports. These models of excellence of institutions and systems engaged in strategic planning for economic development will be presented in a series of workshops so that other states can replicate parts of these models appropriate to their context.

Having broad stroked the multi-year plan of action, let us concentrate in greater detail on selected aspects of it. If we have learned one lesson from workshops and research on organizational change, it is that the critical mass of top leadership must be involved in the project. Therefore, institutions that participate in the project should be represented by a <u>team</u> consisting of the chief executive officer, the chief academic officer, the chief student services officer, the chief fiscal officer, and a faculty leader. Systems that participate in the project should be represented by such a team from each institution.

Research and experience indicates that most of our institutions focus on the coordination of internal matters. For that reason the weeklong Snowmass Institute on Strategic Planning and Management begins with an assessment of the external environment. The proposed program in FIGURE 5 borrows heavily from the Snowmass model. Monday includes an overview of strategic planning, the transition from the industrial society to the technical society, and an examination of population and social characteristics produced by the Census Bureau. Participants would work with data about their service area. Tuesday is dedicated to analysis of economic data collected in 1982 and analyzed in 1983 by the Census Bureau. Analysis of these data should yield a list of opportunities and threats in the external environment. Wednesday is dedicated to an audit of the internal environment including program review based on centrality, quality, and market viability. The product of this day should be a listing of strengths and weaknesses. Thursday is dedicated to an examination of strategic options and tactical alternatives, integration, and sources of information. Sources of information would include the CEDaR-Member R & D centers, the ERIC Clearinghouses, the Office of Technology Assessment, and many other resources. Friday is dedicated to a presentation of plans of action and a discussion of the next steps.

The design of the second, third, and fourth regional conferences would be a collaborative effort of the SPED Committee, participants and national experts.

The logic of having 4 regions is tied to the need to have a workable number and to Census Bureau service areas. Region 1 would be comprised of the 6 states in the CB New England area and the 3 states in the Middle Atlantic area. Region 2 would consist of 8 states in the South Atlantic area, 4 states in the East South Central area and 4 states in the West South Central area. Region 3 would consist of the 5 states in the East North Central area and 7 states in the West North Central area. Region 4 would consist of the 8 states in the Mountain area and the 5 states in the Pacific area. (See FIGURE 6)

FIGURE 5

REGIONAL WORKSHOP #1 - GETTING STARTED: DATA GATHERING

| | SUNDAY | MONDAY | TUESDAY | WEDNESDAY | THURSDAY | FRIDAY |
|---|---|---|---|---|---|---|
| MORNING | | STRATEGIC PLANNING FOR ECONOMIC DEVELOPMENT | CENSUS BUREAU ECONOMIC AND AGRICULTURE DATA 1983 | INTERNAL AUDIT ORGANIZATIONAL ELEMENTS | STRATEGIC OPTIONS TACTICAL ALTERNATIVES | TEAM REPORTS |
| | | ASSESSING THE EXTERNAL ENVIRONMENT | | PROGRAM REVIEW CENTRALITY QUALITY | INTEGRATION | THE NEXT STEP |
| AFTERNOON | | CENSUS BUREAU POPULATION DATA 1980 | DEVELOPING A PROFILE OF THE SERVICE AREA | PROGRAM REVIEW CQ AND MARKET VIABILITY | SOURCES OF INFO R&D CENTERS ERIC OTA | |
| EVENING | DINNER ——— OVERVIEW OF WORKSHOP | DEVELOPING A PROFILE OF THE SERVICE AREA | PRIORITIZING OPPORTUNITIES AND THREATS | PRIORITIZING STRENGTHS AND WEAKNESSES | DEVELOPING A PLAN OF ACTION | |

FIGURE 6

# CENSUS REGIONS AND GEOGRAPHIC DIVISIONS OF THE UNITED STATES

## REGION 1

### NEW ENGLAND

CONNECTICUT
MAINE
MASSACHUSETTS
NEW HAMPSHIRE
RHODE ISLAND
VERMONT

### MIDDLE ATLANTIC

NEW JERSEY
NEW YORK
PENNSYLVANIA

## REGION 2

### SOUTH ATLANTIC

DELAWARE
FLORIDA
GEORGIA
MARYLAND
NORTH CAROLINA
SOUTH CAROLINA
VIRGINIA
WEST VIRGINIA

### EAST SOUTH CENTRAL

ALABAMA
KENTUCKY
MISSISSIPPI
TENNESSEE

### WEST SOUTH CENTRAL

ARKANSAS
LOUISIANA
OKLAHOMA
TEXAS

## REGION 3

### EAST NORTH CENTRAL

ILLINOIS
INDIANA
MICHIGAN
OHIO
WISCONSIN

### WEST NORTH CENTRAL

IOWA
KANSAS
MINNESOTA
MISSOURI
NEBRASKA
NORTH DAKOTA
SOUTH DAKOTA

## REGION 4

### MOUNTAIN

ARIZONA
COLORADO
IDAHO
MONTANA
NEVADA
NEW MEXICO
UTAH
WYOMING

### PACIFIC

ALASKA
CALIFORNIA
HAWAII
OREGON
WASHINGTON

The MTI conference series would focus on specific topics intended to complement the overall thrust of the project. Themes for 1984-85 are (1) "Megatrends and Research and Development," (2) "Technological Forecasting and Entrepreneurship," and (3) "The Electronic Institution." Programs are displayed in FIGURES 7, 8, and 9. These programs would be linked to the annual conventions of AVA, AASA, and AACJC to minimize travel costs and to permit a broader audience to participate. The speakers would be asked to prepare a paper on the assigned topic that synthesizes research and makes specific recommendations appropriate for vocational-technical education. The paper would be available at least two weeks in advance of the session so that each person serving on the panel can prepare a brief statement of reaction. Panelists would be participants in the SPED project and represent different contexts. The papers and reactions would be published and distributed to participants in the SPED project as well as be made available to others through NCRVE.

The "Data Analysis" regional workshops in the spring of 1985 will provide a great deal of direction about the type of regional workshops and MTI conferences that would be held during 1985-86. By discribing one scenario it is possible to see the potential impact of the project. Economic development can be interpreted in the direction of (1) business climate; (2) attracting, retaining, or expanding business, (3) improving productivity; (4) job creation; (5) competing in the international markets; (6) facilitating technology transfer; or any one of several different ways. The ranking of business climate the forty-eight contiguous states based on 22 measurement factors is displayed in FIGURE 10.[24] The rank for each of the 22 factors for Ohio is displayed in FIGURE 11. These factors could be analyzed to see what strategies could be developed in cooperation with other agencies including state departments of economic development.

Analysis of Census Bureau 1982 economic data will yield a display of "Employees and Establishments By Industry" as displayed in FIGURE 12 for each service area.

FIGURE 7

MEGATRENDS AND RESEARCH AND DEVELOPMENT

December 1984, American Vocational Association Convention, New Orleans

Objectives:

1. To describe briefly the relationship of the "Management of Technological Innovation Conferences" to the Strategic Planning for Economic Development Project and to present an overview of the MTI series.

2. To hear about demographic, social, economic, and technological "megatrends" and interpret their implications in terms of the mission priority of economic development.

3. To analyze the driving force that research and development will have on our changing economy and interpret its implication in terms of the role for vocational-technical education.

4. To discuss the intellectual capital formation needs of the information society and the implications for economic development.

5. To analyze the implications of retooling the workforce for vocational-technical education.

Topics/Format - Speakers/Panel:

| | Topic | Speaker | Panel |
|---|---|---|---|
| 1. | "Megatrends" | John Naisbitt | |
| 2. | "R & D: A Driving Force" | Ronald S. Paul, President Battelle Memorial Inst. | |
| 3. | "Role of Training In Economic Development" | M. Ross Boyle, V.P. McManis Associates, Inc. | |
| 4. | "Retooling the Work Force" | Pat Choate | |
| 5. | Synthesis & The Next Step | | |

Agenda

| | | | |
|---|---|---|---|
| 8:00- 8:30 | Coffee | 12:30- 1:15 | Lunch |
| 8:30- 9:00 | Overview | 1:15- 2:00 | M. Ross Boyle |
| 9:00- 9:45 | John Naisbitt | 2:00- 2:45 | Panel Reaction |
| 9:45-10:30 | Panel Reaction | 2:45- 3:00 | Break |
| 10:30-10:45 | Break | 3:00- 3:45 | Pat Choate |
| 10:45-11:30 | Ronald S. Paul | 3:45- 4:30 | Panel Reaction |
| 11:30-12:15 | Panel Reaction | 4:30- 5:00 | Synthesis |

FIGURE 8

## TECHNOLOGICAL FORECASTING AND ENTREPRENEURSHIP

February 1985, American Association of School Administrators Convention

Objectives:

1. To describe briefly the relationship of the "Management of Technological Innovation Conferences" to the Strategic Planning for Economic Development Project and to present an overview of the MTI series.
2. To hear about modes of forecasting in order to begin to develop the specifications of a technological and occupational forecasting system.
3. To analyze methods of forecasting in order to develop specifications for the technological and occupational forecasting subsystems.
4. To analyze the research evidence about entrepreneurs, entrepreneurship, and intrepreneurs.
5. To review research about cycles and stages of business growth and how to facilitate entrepreneurship.

Topics/Format - Speakers/Panel:

| | Topic | Speaker | Panel |
|---|---|---|---|
| 1. | "Modes of Forecasting" | Dan Bell, Sociologist<br>Harvard University | |
| 2. | "Technological Occupational Forecasting" | Earl C. Joseph, President<br>Planning and Development<br>Anticipatory Sciences | |
| 3. | "Entrepreneurship" | Arnold C. Cooper | |
| 4. | "Stages of Business Growth" | Lawrence C. Steinmetz | |
| 5. | Synthesis & The Next Step | | |

Agenda

| | | | |
|---|---|---|---|
| 8:00- 8:30 | Coffee | 12:30- 1:15 | Lunch |
| 8:30- 9:00 | Overview | 1:15- 2:00 | Arnold C. Cooper |
| 9:00- 9:45 | Dan Bell | 2:00- 2:45 | Panel Reaction |
| 9:45-10:30 | Panel Reaction | 2:45- 3:00 | Break |
| 10:30-10:45 | Break | 3:00- 3:45 | Lawrence C. Steinmetz |
| 10:45-11:30 | Earl C. Joseph | 3:45- 4:30 | Panel Reaction |
| 11:30-12:15 | Panel Reaction | 4:30- 5:00 | Synthesis |

FIGURE 9

THE ELECTRONIC INSTITUTION
April 1985, AACJC Convention, San Diego

Objectives:

1. To describe briefly the relationship of the "Management of Technological Innovation Conferences" to the Strategic Planning for Economic Development Project and to present an overview of the MTI series.

2. To develop a conceptual framework of the lifelong learning system required to sustain economic development in the information society.

3. To review the latest in brain research about how humans learn at various stages of development and discuss the implications of learning styles and instructional delivery systems.

4. To discuss instructional high technology, including telematics, and the implications for learning systems in the information society.

5. To describe the components of "The School of the Future" or "The Electronic College."

Topics/Format - Speakers/Panel:

| | Topic | Speaker | Panel |
|---|---|---|---|
| 1. | "The Lifelong Learning System" | Robert G. Gillespie | |
| 2. | "Brain Research & Learning Styles" | Bernice McCarthy | |
| 3. | "Educational High Technology" | Christopher J. Dede | |
| 4. | "The Electronic College" | Judith W. Leslie | |
| 5. | Synthesis & The Next Step | | |

Agenda

| | | | |
|---|---|---|---|
| 8:00- 8:30 | Coffee | 12:30- 1:15 | Lunch |
| 8:30- 9:00 | Overview | 1:15- 2:00 | Christopher J. Dede |
| 9:00- 9:45 | Robert G. Gillespie | 2:00- 2:45 | Panel Reaction |
| 9:45-10:30 | Panel Reaction | 2:45- 3:00 | Break |
| 10:30-10:45 | Break | 3:00- 3:45 | Judith W. Leslie |
| 10:45-11:30 | Bernice McCarthy | 3:45- 4:30 | Panel Reaction |
| 11:30-12:15 | Panel Reaction | 4:30- 5:00 | Synthesis |

FIGURE 10

# RANKING OF STATES BASED ON 22 FACTORS AFFECTING BUSINESS CLIMATE

1. Florida
2. Texas
3. N. Carolina
4. N. Dakota
5. S. Carolina
6. Georgia
7. Arizona
8. Nebraska
9. Mississippi
10. Kansas
11. Idaho
12. Louisiana
13. Tennessee
14. S. Dakota
15. Colorado
16. Nevada
17. Virginia
18. Arkansas
19. Missouri
20. Utah
21. New Hampshire
22. Wyoming
23. Alabama
24. Oklahoma
25. Montana
26. California
27. Maryland
28. Vermont
29. Indiana
30. Kentucky
31. New Mexico
32. Minnesota
33. Massachusetts
34. New Jersey
35. Iowa
36. Wisconsin
37. Washington
38. Connecticut
39. West Virginia
40. Maine
41. Delaware
42. Illinois
43. Oregon
44. Ohio
45. New York
46. Pennsylvania
47. Rhode Island
48. Michigan

* Alexander Grant and Company, 6th Floor Prudential Plaza, Chicago, IL 60601

FIGURE 11

TWENTY-TWO FACTORS USED IN

THE FOURTH STUDY OF

GENERAL MANUFACTURING BUSINESS CLIMATE, 1982*

| | OHIO |
|---|---|
| **A. State and Local Government Fiscal Policies** | |
| 1. Taxes | 3 |
| 2. Change in Taxes | 32 |
| 3. Expenditure Growth vs. Revenue Growth | 17 |
| 4. Debt | 8 |
| 5. Welfare Expenditure | 34 |
| **B. State Regulated Employment Costs** | |
| 1. Unemployment Compensation Benefits | 38 |
| 2. Unemployment Compensation Net Worth | 26 |
| 3. Maximum Workers' Compensation Insurance | 42 |
| 4. Workers' Compensation Insurance Rate | 12 |
| **C. Labor Costs** | |
| 1. Wages | 45 |
| 2. Change in Wages | 24 |
| 3. Unionization | 43 |
| 4. Change in Unionization | 22 |
| **D. Availability and Productivity of Labor Force** | |
| 1. Voc-Ed Enrollment | 33 |
| 2. High School Educated Adults | 26 |
| 3. Manhours Lost | 45 |
| 4. Value Added | 40 |
| 5. Hours Worked | 6 |
| **E. Other Manufacturing Related Issues** | |
| 1. Energy Costs | 29 |
| 2. Environmental Control | 48 |
| 3. Population Density | 9 |
| 4. Population Change | 34 |

* Alexander Grant and Company, 6th Floor, Prudential Plaza, Chicago, IL 60601

FIGURE 12

EMPLOYEES AND ESTABLISHMENTS BY INDUSTRY, 1979

| | Number of Employees | Number of Establishments | Number of Establishments by Employment Size | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-4 | 5-9 | 10-19 | 20-49 | 50-99 | 100-249 | 250-499 | 500-999 | 1000+ |
| Agriculture, forestry, fisheries | 9226 | 1939 | 1454 | 282 | 132 | 59 | 7 | 3 | 2 | - | - |
| Mining | 32192 | 1154 | 422 | 241 | 201 | 179 | 58 | 34 | 9 | 9 | 2 |
| Contract construction | 182005 | 19364 | 12012 | 3587 | 2036 | 1235 | 316 | 142 | 27 | 6 | 3 |
| Manufacturing | 1414824 | 15860 | 3619 | 2421 | 2804 | 3047 | 1628 | 1391 | 589 | 264 | 214 |
| Chemicals | 47950 | 653 | 134 | 89 | 121 | 132 | 71 | 61 | 29 | 12 | 4 |
| Petroleum/coal | 7161 | 168 | 55 | 30 | 29 | 25 | 15 | 8 | 1 | 5 | - |
| Rubber/plastics | 100479 | 852 | 135 | 76 | 105 | 201 | 139 | 122 | 46 | 13 | 15 |
| Stone/glass | 52421 | 977 | 207 | 172 | 105 | 194 | 91 | 78 | 19 | 16 | 6 |
| Primary metals | 148712 | 633 | 78 | 62 | 77 | 130 | 98 | 85 | 58 | 28 | 27 |
| Fabricated metal products | 178283 | 2248 | 337 | 279 | 457 | 526 | 289 | 237 | 76 | 24 | 23 |
| Machinery | 216119 | 3515 | 887 | 683 | 683 | 650 | 250 | 198 | 88 | 43 | 33 |
| Electric/electronic | 108036 | 611 | 107 | 66 | 75 | 100 | 79 | 84 | 45 | 30 | 25 |
| Transportation equipment | 176012 | 398 | 55 | 45 | 59 | 60 | 38 | 49 | 36 | 26 | 32 |
| Instruments | 24619 | 297 | 66 | 46 | 50 | 56 | 28 | 27 | 16 | 5 | 4 |
| Transportation | 200809 | 6577 | 2708 | 1127 | 1076 | 948 | 376 | 230 | 65 | 25 | 22 |
| Wholesale Trade | 279939 | 16583 | 6409 | 3953 | 3208 | 2205 | 546 | 191 | 35 | 13 | 3 |
| Retail trade | 751815 | 56626 | 26449 | 14289 | 8505 | 5609 | 1880 | 651 | 116 | 26 | 11 |
| Finance, Ins, R. Estate | 211125 | 18521 | 10899 | 3726 | 2154 | 1171 | 350 | 138 | 47 | 25 | 11 |
| Services | 708079 | 57306 | 33716 | 11728 | 6224 | 3487 | 1178 | 655 | 170 | 83 | 65 |
| TOTAL | 3833422 | 201238 | 103203 | 41908 | 26531 | 18067 | 6339 | 3338 | 1070 | 451 | 331 |

SOURCE: Ohio County Business Patterns 1979 (Washington, D. C.: Bureau of the Census, 1981) pp. 3-15.

Infrastructure requirements for business and industry include utilities, transportation, financing, educational institutions, and other elements which vary in terms of need from business to business. Such an analysis is the first step if the intent is to attract or expand existing business. For example, a report of the Joint Economic Committee of the Congress of the United States indicates the following:

> High technology industries consist of heterogeneous collections of firms that share several attributes. First, the firms are labor-intensive rather than capital-intensive in their production processes, employing a higher percentage of technicians, engineers and scientists than other manufacturing companies. Second, the industries are science-based in that they thrive on the application of advances in science to the marketplace in the form of new products and production methods. Third, R & D inputs are much more important to the continued successful operation of high technology firms than is the case for other manufacturing industries.[25]

Diagnosis preceeds development. What is important is the critical analysis of data to chart a course of action. If the strategy is to help small business, it will be important to also diagnose level of technological development as displayed in the figure below.

FIGURE 13

LEVELS OF TECHNOLOGY DEVELOPMENT[26]

| | LOW TECHNOLOGY | MEDIUM TECHNOLOGY | HIGH TECHNOLOGY |
|---|---|---|---|
| Drafting | T-Square and Drawing Board | Manually Operated Drafting Machine | Computer Aided Design |
| Calculating | Manual Calculators | Electronic Calculators | Microcomputers |
| Typewriters | Manual Typewriters | Electric Typewriters | Word Processing Linked to Local/ mainframe Networks |
| Tools | Hand Tools | Machine Tools | Computer Numerical Control |
| Electricity | Vacuum Tubes | Digital Electronics | Laser/Electro-Optics |
| Biology | Basic Laboratory Analysis Equipment | Genetic Engineering | Cloning |

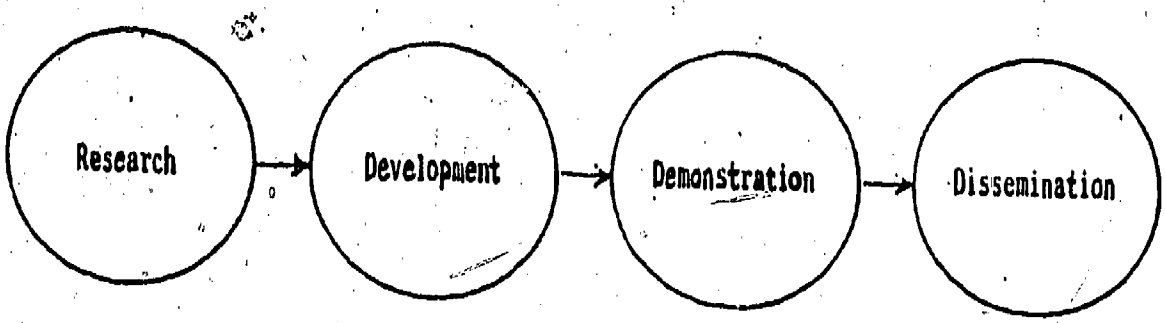
Technology transfer is one way for occupational education to assist in economic development. Technology transfer occurs in varied ways in different societies. Regardless of the way technology transfer occurs, however, it requires the integration of information about (1) the R & D cycle, (2) the new product development cycle, and (3) stage of organizational development. The R & D cycle consists of problem formulation and research, development, demonstration, and dissemination. The new product development cycle includes the gist of the idea, prototype model, full-scale production, marketing, and maintaining. This information must be integrated with information about organizational development to meaningfully reduce the lag in technology transfer. (See FIGURE 14) Information sources useful in technology transfer include the National Training Information Service and the more than 200 Federal R & D laboratories and centers representing 11 Federal agencies in the Federal Laboratory Center (See FIGURE 15), the Office of Technology Assessment and the Congressional Clearinghouse of the Future.

Another way our institutions and systems can become community revitalization mechanisms is to assist municipalities develop strategic goal setting projects. During the late 1960s and the 1970s, a number of municipalities participated in a process to establish and implement communal or statewide goals. In an article in the March-April 1971 issue of City, Routh indicated that some 100 cities and three state governments had launched such an effort.[27] The first and largest of the major goals programs was that of Dallas, underway for nearly six years by 1971. This effort yielded a set of goals in areas of citizen involvement, continuing education, cultural activities, design of the city, economy, elementary and secondary education, energy, environment, government, health, higher education, housing, human service, public safety, quality of the citizenry, recreation and leisure time, and transportation. That process continues today. A 1978 gift from the Dallas Foundation to Goals for Dallas supported the publication Achieving the Goals for Dallas, 1978-1983 (1979). The 37th Arizona Town Hall held on October 26-29, 1980, produced Toward The Year 2000: Arizona's Future. The Texas

FIGURE 14

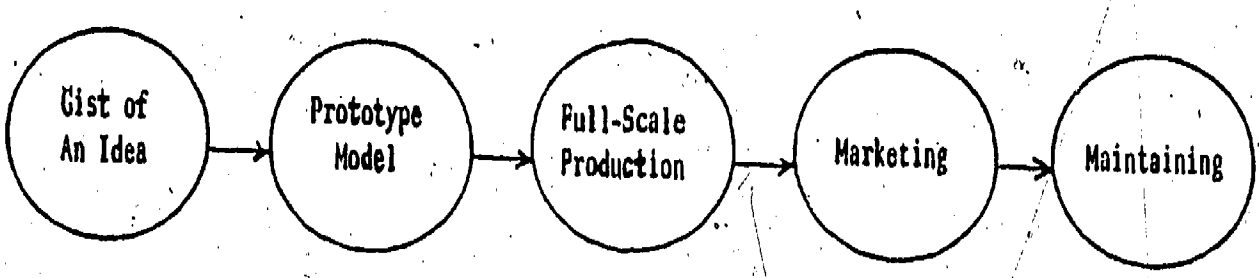
RESEARCH AND DEVELOPMENT CYCLE

Research and Development




NEW PRODUCT DEVELOPMENT CYCLE

Product Development




STAGE OF ORGANIZATIONAL DEVELOPMENT

Organizational Development

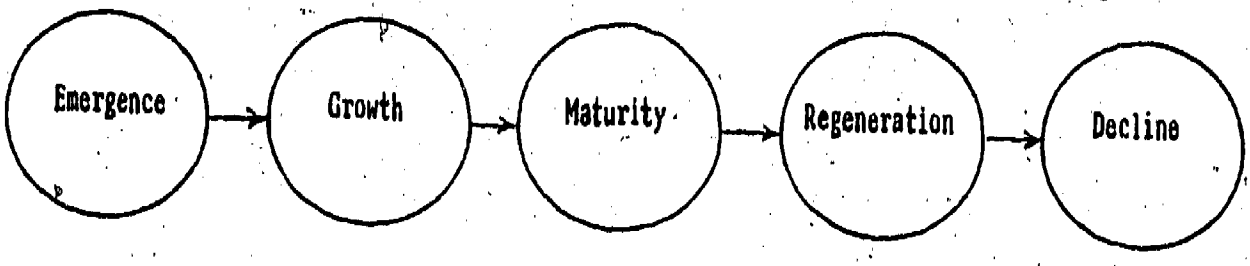
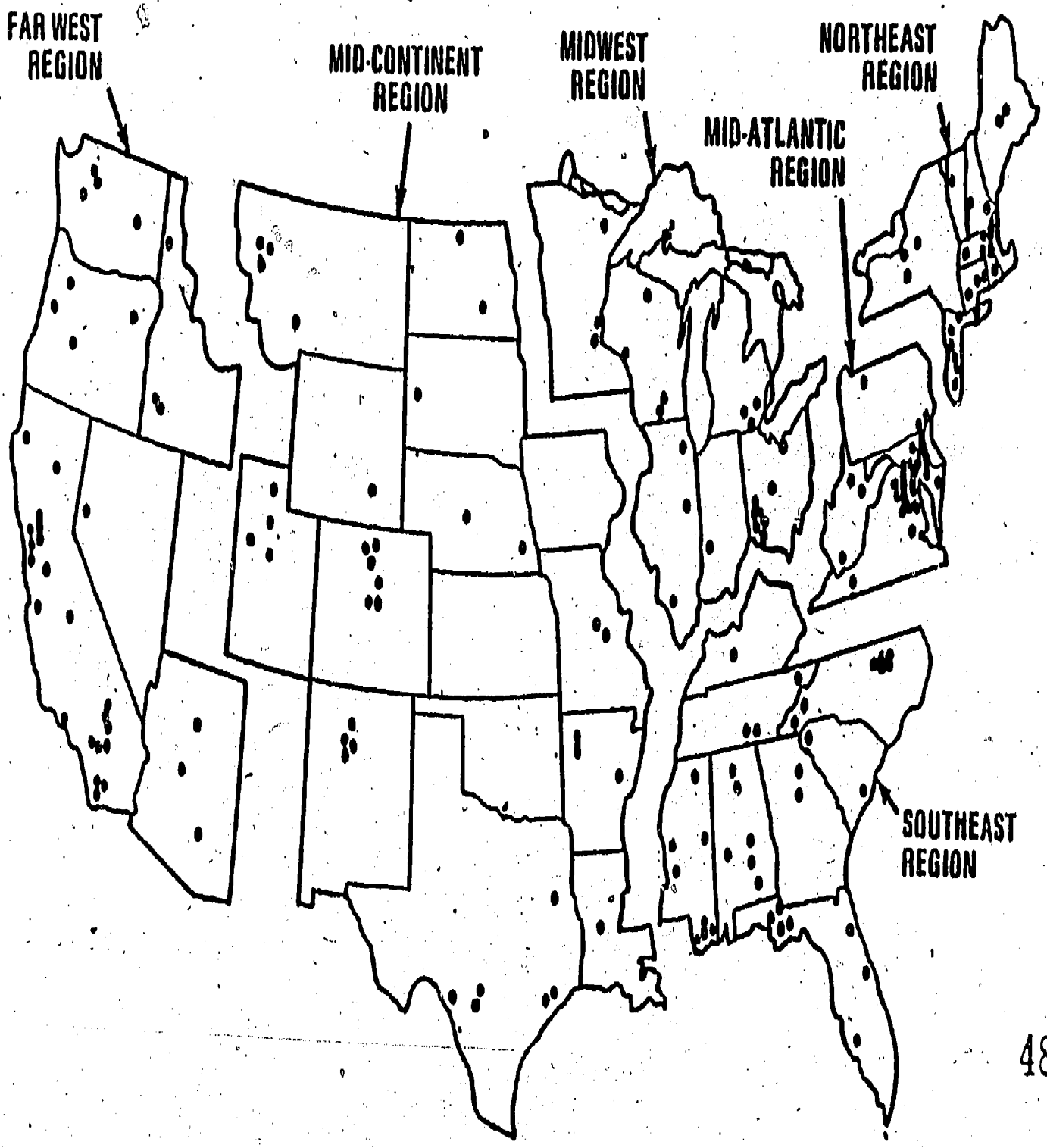


FIGURE 15

# FEDERAL LABORATORY CONSORTIUM



2000 Commission Report of 1982 speaks to economic development and the impact of research and development.

This type of strategic municipal and regional planning is in the early stages of development and will undoubtedly continue in the 1980s. Municipalities interested in undertaking such a process can obtain a Community Planning Assistance Kit from the Council of Educational Facility Planners and assistance from the International City Management Association including its book The Essential Community: Local Government in the Year 2000. Institutions interested in starting leadership development programs can obtain assistance from the National Association of Community Organizations, particularly its document entitled How To Develop A Community Leadership Program.

The products of the project on Strategic Planning for Economic Development would be numerous. First, there would be the synthesis of R & D on selected topics such as strategic planning, economic development, illiteracy, retraining, entrepreneurship, and instructional technology. Second, each participating institution and system would produce a strategic plan for economic development based upon a critical analysis of data about their service area and the appropriate R & D. Third, the reports from the Management of Technological Innovation conferences would provide clarity to a number of issues that should contribute to providing qualitatively superior plans for economic development. Fourth, the clearinghouse in policies on human resource development and economic development should assist participants and other persons in promoting and formulating policies for their service area. Fifth, institutional and system-wide plans that are superior in quality would be highlighted as "Models of Excellence" and from which principles would be derived much like the book In Search of Excellence: Lessons From America's Best Run Companies by Peters and Waterman. Sixth, the "Models of Excellence" will be used in a series of dissemination workshops in order to reduce the lag between the development of new knowledge and its dissemination and implementation. These six products are short term, however, in contrast to the economic revitalization

that should result from a deliberate, intentional, proactive plan of action.

How could the project Strategic Planning for Economic Development become a reality. The AVA Board of Directors could consider the project and ask Vice Presidents representing selected divisions to discuss it during the conference. A blue ribbon committee could be appointed to design the project and submit it to funding agencies. A Request for Participation could be developed as well as a position description for an Executive Director. By April, the project could be announced. During May, participating institutions and systems could be selected and an Executive Director hired in June so that the project could be launched in July of 1984. The National Workshop scheduled for July of 1984 could focus on several of the topics presented at this hearing and serve as a springboard for launching the project Strategic Planning for Economic Development.

Although the proposal is far from complete, it is a think piece intended to illicit thought and reaction. It is possible that the Department of International Trade and Industry could become a reality by 1985 and have analyzed data on the relative strength of American industries in international markets and have formed "competitiveness councils" to alter the position of selected industries in certain markets. This could be factored into the plan. Attention could be given to college - high school partnerships suggested in the Carnegie Report, to the quality of colleges and schools of education, to emphasis of mathematics and science, to special sessions for boards and policy makers, and to showcases of high technology applied to education process. The project could build upon the AVA Economic Development Project completed last year and the AACJC Putting American Back to Work project currently in Phase II. We might even be able to borrow from the Models of Excellence project conducted by the Professional Development Committee of the American Society for Training and Development.

## CONCLUSION

In Megatrends: Ten New Directions For Transforming Our Lives, John Naisbitt states:

> Things are not going to get better, things are going to get different. We are not in a recession, we are in something much more profound than that. We are changing economies and we haven't changed economies for a hundred and fifty years.
>
> Of course there is a lot of uncertainty but we have got to make uncertainty our friend. We have had an economy that rested on the industrial sector, which has served us magnificently for so long, but now we are shifting to a new economy that rests on information and electronics. This is not going to happen tomorrow; it is happening today. We are more in the economy than we are in the old economy.[28]

The industrialized nations of the world are in the turbulent times of a structural shift from an industrial society to a technical society based on information. The scope and rate of change of science and technology is unprecendented and it impacts culturally, psychologically, socially, and economically. The central question is how it will affect society and whether people will be the beneficiaries or victims of science and technology.

Numerous issues will be important in the next decades. No issues will be more important, however, than the relationship of postsecondary to the economy. In the past, postsecondary education saw its relationship to the economy primarily in terms of providing a trained workforce. This focus will continue to be important in the future but not sufficient. New expanded relationships will be required between postsecondary education and the economy in the computer literate, high technology, information society. Strategic planning and management is one means for dealing with the issues of intellectual capital formation and the role of occupational education in economic development in our society's evolution toward a humanistic, person-centered society that is the beneficiary of science and technology. We have the tools. Do we have the spirit and are we willing to commit the resources to dedicate our institutions and associations as instruments to develop that type of society?

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