THE UNIVERSITY OF TEXAS AT AUSTIN

Title: **Perspectives on Business and Emerging Trends For the 21st Century**

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Date: October 16, 1997

Abstract:

In a presentation at the Fall 1997 CBA Advisory Dinner, discusses three mega business trends: (1) the transformation of high technology business from U.S. dominance to a global commodity-based industry, (2) the need for transfer of leadership from the public sector to the business sector, and (3) the emergence of the need for digital/knowledge management and to develop tomorrows talent.

Keywords: high tech; trends; knowledge management

IC² Institute Working Paper WP-1997-10-01

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Perspectives on Business and Emerging Trends For the 21st Century

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Presentation to the
Fall 1997 CBA Advisory Council Dinner

October 16, 1997
Headliners Club
Austin, Texas

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Working Paper #97-10-01

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Perspectives on Business and Emerging Trends for the 21st Century

My last occasion to discuss business trends in an academic setting was on March 18, 1982 at the Southwestern Business Administration Association Annual Meeting. The conference theme was "Managing for Growth with Limited Resources" and my talk was entitled "The Business School in a Changing World: Are Today's Problems Obscuring Tomorrow's Opportunities?" What I'd like to do is start with that presentation as a benchmark for tonight's topic, "Perspectives on Business and Emerging Trends for the 21st Century."

The pertinent excerpt from that paper was as follows:

During the decade of the 1980s, excellence in terms of excellent faculty and excellent students will not be enough. We now need great business schools and not just excellent business schools. Commitment and dedication to greatness as an institution must be the next round of opportunity. Such commitment can then assure us that we are not as Toffler wrote "locked into a credit game" and a "diploma game." I also quoted John W. Hennessey, Jr., then Jones Professor of Management at Dartmouth: "The values of business schools in a changing world suggest the merits of strategic planning, a process we should be uniquely qualified to promote on our campuses." I concluded that paper with the caution that we need to recognize that achieving greatness is a journey, not a destination. It is a process which demands the best of all of us. The talents, judgment, and support of all our constituencies are indispensable as we move together from excellence to greatness.

What I would like to overview with you tonight are perspectives of three mega business trends. The first is the transformation of high technology

business from U.S. dominance to a global commodity-based industry. The second is the need for transfer of leadership from the public sector to the business sector. The third is the emergence of the need for digital/knowledge management and the need to develop tomorrow's required talent.

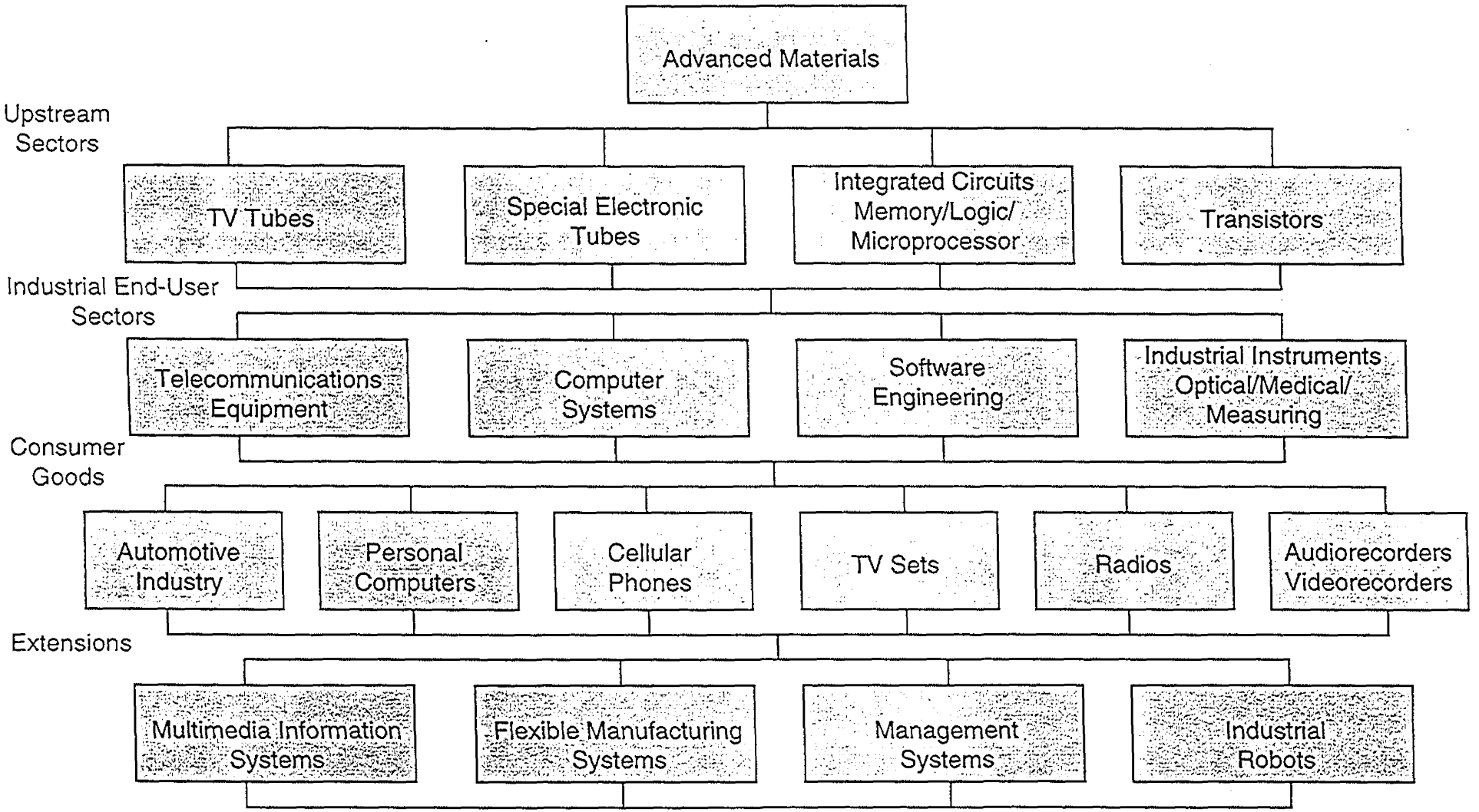
Trend I: Transformation of high technology business.

High technology business, especially electronics-based, deals with advanced materials and components, industrial end-user sectors and consumer goods. These businesses are, in my opinion, now becoming more and more commodity products. Figure 1 comprises what I call the technology chain. It consists of four links or levels. The first level consists of primary products which function as inputs to many other industries. The second level includes branch industries that function as industrial end-users or support sectors to other industries. The third level relates to final consumption goods and services. The fourth levels are used as links to emerging industries or multidisciplinary fields, such as multimedia information systems, flexible manufacturing systems, management planning and control systems, industrial robots, etc. The four key links in the technology chain have broadly expanded into many different industrial and commercial applications, including automotive, petrochemical, food processing, medical and entertainment. The technology chain also impacts education and training.

The first three levels in the technology chain are now primarily global commodities. Dr. Yue and I had published last March "Global Economic Competition: Today's Warfare In Global Electronics Industries and Companies." We point out in the Asian technology chronology that electronics industries have been moving from producing low-technology electronic components to more high-tech-based components and from

The Electronic Technology Chain

Figure 1



assembling electronic components to producing systems, equipment and instruments. One can evaluate the impact of this high technology trend in two dimensions – at a national level as well as at the firm level. The global national warfare, as you would expect, has driven the price of the first three chains to become commodities. Global price competition at the firm level is fierce and has forced U.S. managers across the board to find newer ways to sustain profitability rather than just relying on technology as an asset.

As most of you know, net imports are a critical measure in generating a nation's wealth. What happens to a nation's imports and exports has a major impact on its wealth generation abilities. Table 1 shows net trade surpluses as of 1993.

Table 1

1993 Net Trade Surplus

Asian Group	(In Billions)
Computers	$ 8.12
Sound Recorders & VCRs	7.73
Telecommunications	7.45
Radios	5.64
Integrated Circuits	4.56
Computer Parts & Accessories	4.07
Television Sets	3.01
Office Machines	3.45
	$ 44.03
United States	
Measuring Instruments	$ .84
Western Europe	
Telecommunications	1.50
Industrial Instrumentation	2.90
	$ 4.40

The Asian group (Japan, Taiwan, South Korea, Singapore, Malaysia, China, Thailand and the Philippines) showed the largest trade surpluses in computers, sound recorders and VCRs, telecommunications, radios, integrated circuits, computer parts and accessories, television sets, and office machines. The only segment in which the Asian group showed an average annual trade deficit was less than $1 billion in measuring instruments. The only segment in which the United States had a net trade surplus in high technology was measuring instruments. Western Europe showed a net trade surplus in telecommunications and industrial instrumentation.

In 1993 on a four-powers basis; namely, the United States, Japan, Germany, and Great Britain trade balance basis, Japan has a total net trade surplus in high-technology electronics of $11.5 billion. All of the other three nations have a net trade deficit – the United States, $19.4 billion; Germany, $7.5 billion; and Britain, $5.7 billion.

In summary, the business trend in high technology is that the U.S. high-technology-based products in the first three chain levels are commodities. As you all know, commodities have lower profits and lower return on investment. A discernible trend for business is that high technology does not depend on natural endowments such as good climate, arable land and available mineral deposits – or even the first to develop the science and technology, and the first to market.

High technology business' comparative advantages trends are due more to the globalization process, integration and government intervention. The globalization of the electronics high technology industry was initiated by U.S. companies. The Japanese quickly followed and by 1993 Japan was in all of the fourteen electronic commodities we measured. Japan since 1978 has

substantially reduced its export share of TV tubes, sound recorders and VCRs, television sets, radios, and office machines. They have been moving toward a higher technology level and higher value-added manufacturing.

Under global conditions, a firm's economic decisions include what to produce, where to produce, where to sell, to whom to sell, how to sell, how to service an order, where to produce, and how to take advantage of multinational resources and markets. A firm can no longer follow economically an academic behavioral model such as oligopoly or monopoly. At the same time, high technology companies' risk factors have increased by foreign-currency denomination, changing economic and political conditions, diversification and differentiation of products, and technology superiority. The situation in high technology is complicated by widely applied government intervention, promotion and protection.

Let's move from national trends to measuring performance trends at the firm level. Benchmarking, or measuring best performance at the firm level, for competitive analysis is multidimensional, such as economic growth and global market share, labor productivity, return on asset investment, cost efficiency, profitability, R&D investment, and stock price performance. See Table 2.

Table 2

Best Firm's Performance Benchmarks

• Economic growth and market share	-	Japan
• Labor productivity	-	Japan
• Return on asset investment	-	Japan
• Cost efficiency	-	US, Brtn., Fr.
• Profitability	-	US, Brtn.
• R&D investment	-	US, W.Eur.
• Stock price performance	-	US

Japanese companies lead in economic growth and share of markets, labor productivity and return on asset investments. The U.S. companies' benchmarks lead in cost efficiency in computer manufacturing, software, and industrial instrument clusters. British companies had cost efficiency in the electronic components and telecommunication clusters. French companies led cost efficiencies in consumer electronics. None of the Japanese companies were cost efficiency leaders.

U.S. companies set the profitability benchmarks for computer manufacturing, computer software, and consumer electronics. British companies held the profitability benchmarks for telecommunications equipment and industrial instrumentation segments. The Japanese lost their profitability benchmark after 1991. International benchmarks for R&D expenditures were established by the United States and Western European electronic companies. None of the Japanese group showed the highest R&D ratio in any cluster. Finally, the best players in terms of stock price performance were all U.S. companies.

The global trend of high technology business products becoming more and more commodities confirms that a new kind of economic goods and services are making their appearance in the marketplace. Both Dr. Yue and I think they have the potential of revolutionizing the workings of the entire capitalist economy as well as generation of a nation's wealth and prosperity, and deeply impact on the management of 21st century basic and technology-based firms. I'll expand this point as the third business trend.

Trend II: Business Leadership for the 21st Century.

As I mentioned at the end of the 1982 paper, achieving institutional greatness is a journey and not a destination. I quickly learned on a decade-long journey that excellent institutions in academia, business, and government were not good enough. How they coordinated their efforts and collaborated and cooperated was very important in a capital shortage economy. Between 1984 and 1995 I took a number of steps to determine how the academic, business, and government sectors could collaborate and cooperate in commercializing science and technology to generate wealth and prosperity at home and abroad.

These steps are shown in Table 3.

Table 3

Highlights of IC^2's Commercializing Science & Technology

1984-85:	America – Scientifically Creative, Technologically Adept, Managerially Innovative, and Entrepreneurially Daring.
1985-86:	Resolving the Paradox of Global Competition and Cooperation.
1977-87:	The First Decade – A Commitment to Risk-taking and Risk-sharing.
1987-88:	The Austin Technopolis – High Technology, the University and Economic Development.
1988-89:	Smart Infrastructure – Creating the 21st Century.
1989-90:	Technology, Intellect, and Enterprise: A New Frontier.
1990-91:	The Catalyst Organization – Talent, Networks, Knowledge.
1977-1992:	The First Fifteen Years – Technology Incubation: A New Laboratory-to-Market Approach.
1992-93:	IC^2 Proactive Dissemination – From State-of-the-Art Research to Innovative Implementation.
1993-94:	A Year of Significant Awards.

Cold Peace is a period of transforming our attention from a well-defined military/political enemy, such as the USSR, to how we cooperate and collaborate within communities and regions and between states as well as countries to compete more effectively domestically and globally. The 1990s is a period in which our corporations downsized, domestic and foreign giant companies globalized, military bases closed, and post Cold War defense conversion took place. We need to do more than just retrain or provide a safety net or subsidy for the "Cold War" workforce and communities.

Federal expenditures, especially in the area of R&D have been very important in building America's technological base and future. The way this generation of business leaders goes about converting its legacy into wealth is key. If the community or region does not utilize and regenerate the fifty years invested in human and technological resources, they will dry up or depart to other communities, regions, or other parts of the world. And let me emphasize that only the private sector can truly ensure that this does not take place!

If there is a trend that I can convey to you, it is that now is the time for business and entrepreneurs and wealthbuilders to help orchestrate America's economic future. Now is the time to develop America's technologies for expanding current business clusters as well as developing emerging industries for tomorrow's globally competitive markets. In a Cold Peace era, the leadership roles need to be transferred from government to business. Business leaders must better understand and accept their newer roles if we are to build America's future for all its citizens.

As a pioneering example, in September of 1996 Texas business sector leaders of nine technology industry sectors, representing much of the strength of the Texas economy, participated in the First Texas Technology Summit.

They worked to identify major issues and recommendations, develop state-wide partnership groups, and define strategies for the combined industries. At the center of the strategy was the use of industrial leadership to implement new private/public partnerships to develop and commercialize technology resident in the high technology industries in the State of Texas.

The Summit identified five cross-cutting issues to develop and implement. See Table 4.

Table 4

First Texas Technology Summit

Cross-cutting Issues

1. Education and Workforce Development
2. Private/Public Partnerships
3. Intellectual Property Rights
4. Communication with Public
5. Incentives and Barriers to Business

The outcomes from the First Texas Technology Summit are: first, Governor Bush formed the Governor's Council on Science and Technology. A number of break-out sessions including the dissemination of issues and recommendations were held with various Chambers of Commerce, the Texas Lyceum and other organizations. A second mini-Summit will be held in 1998 with Texas' private business sector's focus on specific actions and needs for talent and skills developments.

The 21st century will require a new brand of leadership in all sectors including academia, business and government. All sectors are seeking ways to ensure their survivability and success through creativity and innovation. Academically creative and innovative management is the basic core of

knowledge for all fields and disciplines and not just business. Creating or developing knowledge and its dissemination in a coordinated way is a necessary but not sufficient requirement. We need to recognize that if we continue to expect higher education to develop knowledge resources through basic research and/or through collaborative public-private partnerships we are facing a dichotomy of the first order. The dichotomy is why should private firms share scientific advances or unique technology with other non-participative firms. Public universities are especially prone to this dilemma. Successful commercialization requires someone to put large amounts of money at risk not only to create new science, advanced technology, or pioneering knowledge but also for their transformation into wealth and prosperity.

Communities in the cold peace era are looking more and more to their universities and firms to give back more. They want to benefit from the economic value that can be spun out of basic/applied research. Non-university communities and rural areas are beginning to wrestle with technology resource deprivation. Lack of technology resources is becoming more and more recognized as a more important issue than economically deprived regions. In the words of Dr. Skip Porter, "As the community begins to expect more from its universities, university leaders and faculty acolyte will need to start promoting the community and not only expect the reverse. The cultural shock for today's academician is to accept the responsibility of being relevant and not just important."

As the decade of the 1990s nears its end, we are beginning to wrestle with the following questions:

1. How does leadership of American business capitalize upon innovative breakthroughs and opportunities as they arise?

2. Does the American dream of hard work and a good education provide acceptable stable standards of living?

3. Should business provide real-time learning to all levels of our society?

It was sufficient for me in 1967 to announce a commitment to educate and train the managers of the technical and intellectual resources. In 1997 that conceptual construct is not enough. In the 1970s to 1990s it was sufficient to identify IT as a key resource that would bring together breakthroughs and advances in computers and communications. For the 21st century we see that new kinds of goods, products, and services are on their way into the marketplace which has the potential of revolutionizing the entire capitalist economy.

Trend III: Need for Digital/Knowledge Management and the Need to Develop Tomorrow's Required Talent

The third mega trend I'd like to discuss is digital/knowledge management. The 21st century will witness the rise of newer kinds of economic goods and services that are digital in form, heavily dependent on knowledge and in many respects will transform today's technology information society into a digital/knowledge-based economy. The first decade or two will be heavily dependent on digital products in communication, education and entertainment. Sten Thore in his paper "The Economics of the Information Age: Industrial Turmoil and Rapid Evolution," set forth a new paradigm based on the following four points:

1. The life cycles of knowledge products are often short, due to intense product development. As new and advanced products are launched on the

market, the earlier generations become obsolete. Typically, the new generation of a product embodies not only upgraded technological and marketing characteristics, but also a wider array of attributes. Defining a product by the vector of services it delivers, the dimensionality of this vector increases all the time. Products become more *complex.*

2. Those corporations that successfully market and sell the most advanced products at any given point in time will experience spectacular growth rates – so called *hyper-growth.* Economists have been late in recognizing this phenomenon, so characteristic of the knowledge economy. Conversely, corporations clinging to product laggards can see their markets collapse over night, with disastrous results. The knowledge-based economy can become polarized into two camps: swarms of small startup companies growing at phenomenal rates, and stumbling giants.

3. The high tech corporation is typically embarked on a dynamic path that is located far from equilibrium all the time. The orbit is nonlinear. It harbors the possibility of *chaos.*

4. In the resulting setting of industrial turmoil, there will occur rapid *technological evolution.* A kind of balance will be established between creativity and oblivion, between the commercialization of new products, the launching of new startup companies, mergers and acquisitions, and bankruptcies.

For transformation into wealth and prosperity digital/knowledge technology resources require a new kind of management: product cycle management. As Debra Amidon wrote, "Strategy is now a matter of leadership more than plans – the ability to inspire vision more than articulate it and the notion of sustained movement over time rather than financial short-term successes." The attributes of inspiration, vision, know-how, knowledge, and experiential

learning are intangibles. Of course, they can be called intellectual capital but they reside in peoples' minds and cannot as yet be represented on the balance sheet. Knowledge is "a human process dealing with mental objects, requiring awareness and intuition and is only transferable through learning." Digital information is easily transferable and reproducible at a low cost. Human knowledge used innovatively is at best a scarce and costly asset.

At the same time the digital/knowledge industries are one where walls are coming down between nations, industries, sectors of the economy and between functions of an organization. The new knowledge industry recasts our focus from the value chain of R&D, production, and marketing and distribution, and the business functions of finance, accounting, human resources, management information services, R&D, manufacturing, sales distribution, total quality, etc. It drives the focus to design and process sciences, simultaneous developments, concurrent engineering, agile manufacturing, virtual organizations, etc., with little if any revenue generation let alone profitability. It takes courage as well as wise and lucky leadership to balance short-term, medium-term, and long-term sustainability of a firm.

Business leadership has the abilities to manage the value-added chain, the technology chain, and knowledge innovation chains simultaneously. The knowledge innovation chain is "the creation, evolution, exchange and application of new ideas into marketable goods and services for the excellence of an enterprise, the vitality of a nation's economy and the advancement of society as a whole. It's the velocity of change. In short, the knowledge society breaks the old 1990s MBA. Enterprise creation and innovation is an emerging competitive digital technology-based economy realizing the value of interdependencies rather than close-kept intellectual property assets of the last twenty-five years.

It is hard to deal with complexity and change in a digital/knowledge society. Neither a firm nor a community nor a university or even a college and graduate school of business deals within its own boundaries. To succeed and survive is chaotic. Both success and failure cause problems. Hyper growth is so rapid that staffing problems and staying lean and hardy is difficult.

What is needed is more than a paradigm for the digital/knowledge society. A new kind of economic analysis and theory is needed to determine whether the digital/knowledge revolution will usher in an era of prosperity or bust. Knowledge is a newer form of capital whose marginal productivity can actually be increasing rather than decreasing. On the other hand, the digital knowledge doesn't produce a nice orderly economy. Witness what is happening in the telecommunications segments of long-distance and regional telephone, cable TV, data transmission as well as what is coming in energy generation and distribution. There can be so many alternative future courses that the results are best described as industrial chaos. A situation which can push an economic system into concurrent global collapse.

To a large extent meeting the demand for digital/knowledge products is a management problem – a management that is more perceptive than ever on its evolution, potential, and limitations.