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White Paper : Knowledge Supply Chain

Maine Technical College System

Center for Career Development

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The Center for Career Development is part of the Maine Technical College System. WINTER 2000

Knowledge Supply Chain

NO BUSINESS IS IMMUNE from the effects of today's global, technological economy. It's an information age, where knowledge is the most prized resource. It's a fast-paced work environment, marked by continuous change. And — in many areas — it's an excruciatingly tight labor market, where high-skilled job creation far outstrips labor force growth.

"The external world is changing and having a very direct impact on companies, schools and the rest of our systems," notes Bob Jones, CEO of the National Alliance of Business.

INTRODUCTION

"The skill demands and shifts that come from the economy — and the shortages that creates — is a permanent condition for our future. It's not simply a figment of a positive economy."

Speaking at a June 1999 symposium on workforce development issues, sponsored by the Maine Technical College System's Center for Career Development, Jones urged education and industry leaders to "begin to examine the current processes and institutional relationships and understand how to deal with the workforce development issues of tomorrow."

Critical among those issues, he said, is a re-examination of knowledge acquisition — both within the business community and within our educational systems. Traditionally, these systems have connected only tangentially. School systems have given students a broad knowledge base to prepare them for employment. Businesses have undertaken their own onsite education, training, and selection processes.

But in an age in which technology and its accompanying knowledge changes so quickly, argued

Jones, "there must be an integrated system. Students must have curriculum that relates to the demands of the market and develop competencies respected by employers." Increasingly, employers are turning to education systems to undertake many of the training and hiring functions formerly performed in-house. "It's no longer: 'We're the educators, we'll make good citizens.' and 'We're the employers, we'll do our business. Call us later.' There is a profound connection," said Jones.

Given the speed at which information is now being traded, the demand for a new relationship between industry and education raises challenging questions:

- How do employers define and measure the knowledge base of their business, even as it changes?
- How is that knowledge communicated and converted into practical purposes?
- How can educational systems create curriculum and credentials that reflect the changing demands of industry?
- And how can each sector join together to prepare more efficiently the new "knowledge workers" in such high demand in today's economy?

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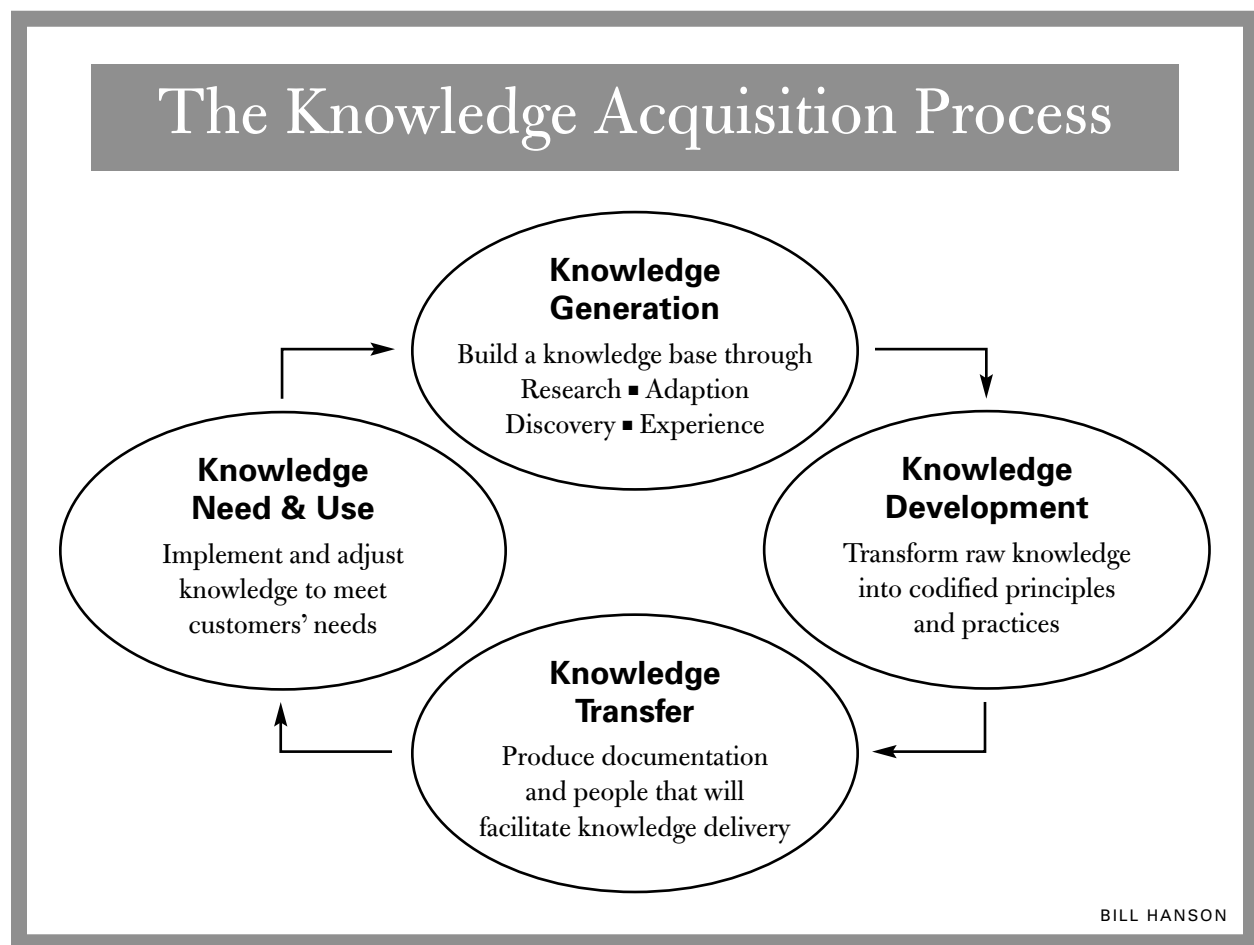
At the Massachusetts Institute of Technology (MIT), industry experts are turning to a familiar manufacturing model for practical answers to these questions — a version of supply-chain management known as the Knowledge Supply Chain.

The Knowledge Supply Chain (KSC) concept views knowledge as a raw material, to be discovered, shaped, communicated, then applied to meet customer needs — much as raw iron ore is mined, processed and turned into steel by the supplier to the tolerances defined by the customer. Once a business has defined the specifications of a particular type of knowledge, the workforce training for it can be effectively out-sourced to technical and community colleges, which are already familiar with the process of applying knowledge to the development of career skill standards, and to other

educational institutions. The KSC invites business into a customer-supplier relationship with education, creating the flow of skilled, trained workers they so desperately need and increasing the productivity of new workers.

“It’s simply a process that begins to get the knowledge users hooked up with the knowledge suppliers,” noted MIT’s Bill Hanson, Industry Co-Director of the Leaders in Manufacturing Program and the originator of the KSC model. “It’s a way to get industry and education coming together — as well as providing a vehicle for continuous education and training.”

In the following pages, KSC practices will be examined in more detail.



“We have moved from a world where the key to wealth is how you seize, hold and exploit territory to a world in which the key to wealth is how your country or company amasses, shares and harvests knowledge.”

T H O M A S L . F R I E D M A N

“The Lexus and the Olive Tree: Understanding Globalization”

Knowledge Supply Chain in Brief

THE KNOWLEDGE SUPPLY CHAIN (KSC) treats industry’s need for knowledge workers as an issue directly addressed by basic and higher education. In this model, educational institutions serve as knowledge transfer experts, helping to prepare students with tangible skills that they can effectively apply to specific jobs. Their skills can be benchmarked, so that workers arrive at jobs with customized knowledge and certified credentials. To do this, businesses must specify in detail the knowledge and skills necessary to perform the job. A program to meet those specifications is developed between the company and the educational institution, with a feedback loop that allows the knowledge base to be continually adjusted, as technology and work requirements evolve.

The KSC works on three underlying principles:

- 1 Knowledge is a precious commodity to be discovered, developed, transferred and used.
- 2 People are valued “knowledge suppliers.”
- 3 Knowledge acquisition is an ongoing process.

By participating in KSC programs at educational institutions, students can gain theoretical education and practical training in specific occupations, according to precise industry specifications. They can leave their education prepared to do the work of the partner-company. Because the training also incorporates degree programs, they will have the broad knowledge base to adapt to changes in their industry and apply their skills to new jobs if the economy shifts. Thus, the KSC model covers the essential demands of today’s knowledge-based economy: speedy, flexible knowledge acquisition and application.

For businesses, the process maximizes the quality and skill of individual employees, while streamlining costly in-house hours spent on workforce training. It allows them to build a workforce faster, better and cheaper — a decided competitive advantage in today’s economy.

The Business Advantage: EMC Corporation

RESULTS OF KNOWLEDGE SUPPLY TRAINING AT EMC CORPORATION

- On-the job training reduced from 30 days to 10
- Reduced “ramp up” time for new workers by 50%
- Reduced “veteran’s tax” (production time lost by experienced workers while they orient new trainees) by 20%
- Reduced cost of bringing each hire up to competency from \$57,700 to \$19,300 — equaling 20 days of additional productivity
- Increased employee retention from 95% to 99%
- Total savings per hire: \$163,000

AS A CONCEPT, the KSC has far-reaching implications for the structure of our existing business and education systems. As a business solution, it has very practical results. By creating incentives for potential or existing employees to expand their knowledge and skill base, the KSC begins to address America’s skilled labor shortage.

Businesses save significantly on recruitment, training and cycle times. Experts estimate that KSC-based training:

- reduces the cost of finding skilled workers by 20 percent
- reduces training time by 50 percent
- significantly improves quality
- reduces cycle times to deliver products or services by 50 percent
- creates effective communication between business and knowledge providers

These benefits were put to the test in 1996 at EMC Corporation of Hopkinton, Mass., a manufacturer of electronic storage devices. As a start-up company competing for a share of the IBM-dominated field, EMC entered the market in 1990 with a zero percent market share, compared to

IBM’s 78 percent. By 1994, they had 36 percent of the market, compared to IBM’s 32 percent share.

According to Steve McConnell, who was then EMC’s Director of Curriculum, their success came from basic TQM principles. “Concentrate on your core competencies and leverage other people for other components,” he said. “We didn’t have to build a factory for everything, but could [use] best in class suppliers for the components that would make up EMC’s storage system.”

When EMC found it needed to greatly increase its number of production technicians in order to continue its growth, McConnell looked to several possible training methods — Hanson’s Knowledge Supply Chain model among them. “Why not do with knowledge what you’ve done with materials?” McConnell said. He decided to outsource his worker training to two local community colleges, where associate degree programs were created to quickly fill 70 positions at EMC and meet expected growth needs in the future. “Today, if you can’t do it better, faster and cheaper, you don’t do it,” noted McConnell.

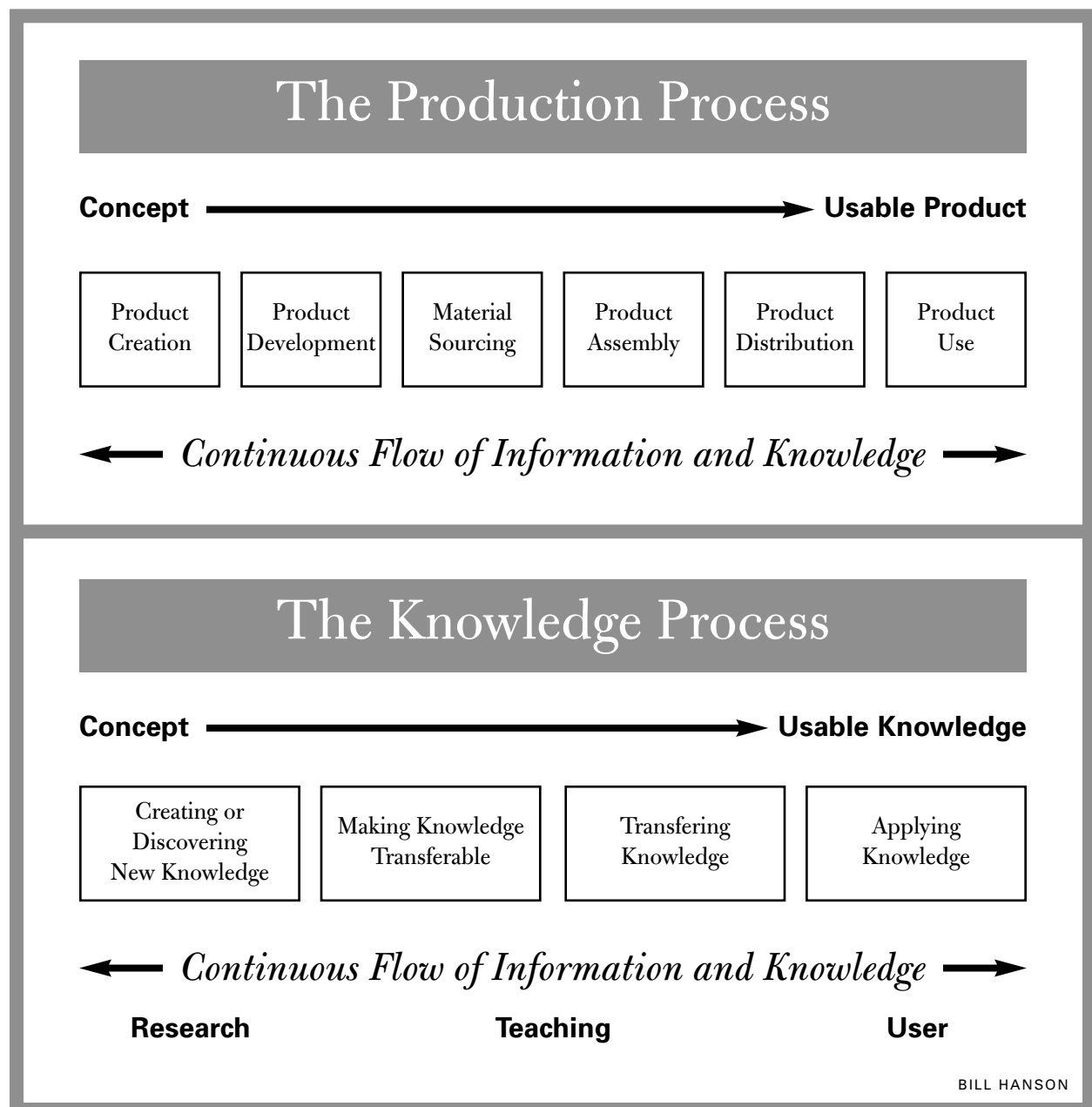
The associate degree program could be completed within 12 months, rather than the normal two-year time frame, and included specific knowledge and skills for EMC's workplace. EMC paid the tuition for every student who successfully completed the program and stayed with the company for a year, and guaranteed each graduate a job. Educators worked with EMC to develop targeted curricula, as well as job performance benchmarks.

From the first training program, 39 of the 40 students who participated were hired.

"We've spent less than a third of what we would have

otherwise," said McConnell. Workers trained under this model were so well-keyed to the job, that employees "hit the ground running."

However, McConnell cautions other businesses that outsource training under the KSC model to work hard with educators to develop detailed specifications for their knowledge base. "We tend to think that because we're talking about people, it's too mushy and we can't specify what we want. We'll just know it when we see it. Our [KSC] experience taught us you can specify what the knowledge is — and you don't have to stop treating people as people."



EDUCATION

AND THE KSC

ALL EDUCATION PROVIDERS today face growing pressures to prepare students more directly for careers in the new economy — from K-12 programs through advanced degrees. In some instances, this is addressed by adapting academic curriculum to make it more relevant to the knowledge and technology of the workplace. In other, career-oriented institutions — such as community and technical colleges — educators are infusing occupational curricula with the “complimentary skills” in high demand by today’s employers, such as communications, team work and problem-solving.

But whether the educational institution offers a liberal-arts focus or an occupational orientation, training partnerships with business raise some far-reaching questions for education:

- How does the knowledge supplier (educator) develop a business-specific curriculum while maintaining the integrity of their overall educational product?
- How does industry-customized education mesh with accreditation standards?
- What kinds of credentials and certifications can be awarded?
- What are the training implications for faculty?

The Maine Technical College System (MTCS) has been finding the answers to these questions through a number of its initiatives that match the core principles of KSC. As MTCS President John Fitzsimmons says, “We have the faculty, equipment and curriculum to develop industry-based programs. Plus, industry and business already play a key part in developing programs with us.”

In addition to their regular occupational programs, the technical colleges work closely with their local business partners to provide customized training and education designed to meet the skill requirements of a particular business or industry. For new and expanding businesses, Maine Quality Centers offers State-funded, customized training and education provided by the technical colleges at no cost to businesses creating new jobs. The college and

business become partners in defining and meeting the skill requirements of the business. The college designs and delivers the training, manages recruitment and screening, and provides other technical support to the business on whatever timeline the business’s needs dictate. This very successful program has been widely supported by business and public policy leaders as a highly effective economic development tool for Maine.

Another MTCS program, Maine Career Advantage (MCA), has established a way for businesses to reach a new audience for recruitment, and participate in their skill development. MCA recruits high school students into internships in over 20 occupational areas with over 400 businesses participating across the state. Students work at the business site performing the actual work of the company. Their progress and competency are measured regularly against industry-defined skill standards. And students attend technical college during their career internship, learning both the academic and occupational skills at the same time. This program has been recognized nationally and internationally as an innovative model for preparing young adults for today’s workplace and for higher education.

The mission of the MTCS is to educate Maine citizens for occupations, to provide a skilled and adaptable workforce for Maine employers, and to support local and statewide economic development. These programs each apply KSC principles in support of that mission by starting with the specifications of the business and delivering a certified product that meets those requirements. MTCS also offers industry certification programs side by side with its degree programs and the targeted programs mentioned above. MTCS seeks to expand its connection to employers as a primary supplier of workforce education and will continue to seek chances to apply KSC principles for the practical benefit of Maine students and businesses.

As Bill Hanson has said, “If we don’t do something to stay competitive, other countries will. To have the future jobs, we’ve got to be continually innovating, creating the next set of products and services.”

SYMPOSIUM PRESENTERS



Bill Hanson has been Industry Co-director of the MIT Leaders for Manufacturing Program since 1992. He worked with Digital Equipment Corporation for over 20 years in Manufacturing Operations, becoming Vice President — first of Manufacturing, then of Logistics and Supply Chain Management. For his work in integrated manufacturing processes, he received the Donald C. Burnham Manufacturing Award from the Society of Manufacturing Engineers.



Bob Jones, CEO of the National Alliance of Business, is widely recognized as an expert in workforce development. Serving as Assistant Secretary of Labor for Presidents Reagan and Bush, he was responsible for federal workforce development and training policy. He played a key role in the Hudson Institute's research and report, *Workforce 2000: Work and Workers for the 21st Century*, and was responsible for the Department of Labor's SCANS Commission. He is the recipient of numerous awards, including the Presidential Distinguished Executive Award.



Joanna Jones is Director of Employee Development, Employee Relations, and Employment for Bath Iron Works Corporation (BIW), a General Dynamics company, one of the nation's largest shipbuilders. She has worked with BIW since 1981. Joanna serves in leadership positions on the Maine Jobs Council, a shipbuilding industry panel on human resources, and the Maine State Apprenticeship and Training Council. She also serves as a trustee of the Maine Technical College System.



Steve McConnell's 17 years in the high-tech industry have focused primarily on supply chain management and corporate university development. Steve served as Director of Curriculum for the corporate university of EMC, a high-tech, Fortune and S&P 500 company. Steve and Bill Hanson established Manufacturing Technical Knowledge Supply Chains with two community colleges. Steve is now Co-founder and President/CEO of Visual Learning Systems, a pre-IPO startup leading innovations in technology-based training.



CENTER FOR CAREER
DEVELOPMENT

International Advisory Board of Governors

The Center for Career Development was established in 1992 as part of the Maine Technical College System. The International Board serves as a resource to provide overall guidance on the Center's work. Its members are:

The Honorable John R. McKernan, Jr., *Chairman*
McKernan Enterprises

J. Duke Albanese, *Commissioner*
Maine Department of Education

Paul Cole, *Secretary/Treasurer*
New York State AFL-CIO

John Fitzsimmons, *President*
Maine Technical College System

Leon Gorman, *President*
L.L. Bean, Inc.

Bertel Haarder, *Vice President*
European Parliament

Albert Hoser, *President & CEO*
Siemens Corporation

Steven Crouse, *Director*
Maine Education Association

Roberts T. Jones, *President & CEO*
National Alliance of Business

Richard Langford, *CEO*
City of Cork Vocational Education Committee
Cork, Ireland

Terrence MacTaggart, *Chancellor*
University of Maine System

Georg Piskaty, *Director*
Institute for Educational Research
for the Austrian Economy
Vienna, Austria

Hermann Schmidt, *former President*
Federal Institute for Vocational Training
Bonn, Germany

Marc S. Tucker, *President*
National Center for Education & The Economy

“America spends almost one trillion dollars in the knowledge process.
Of that knowledge process, R&D accounts for about \$200 billion.
We’re hearing that the education and training piece of the business is
about \$600 billion. The KSC should reduce these costs by about 20 percent.
It’s a tremendous savings. And it’s a tremendous motivator for companies
to stay in the game with various education institutions.”

B I L L H A N S O N

The Center for Career Development is part of the Maine Technical College System. The Center was established in 1992 to design, implement and administer Maine’s ground-breaking, statewide school-to-career program, Maine Career Advantage. Since then, the Center’s mandate has expanded to include the Maine Quality Centers program, international programs, and through the Research & Curriculum Division, products and technical support for other state and national customers. *For additional information, contact Jean Mattimore, Executive Director of the Center for Career Development.*



CENTER FOR CAREER DEVELOPMENT

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