

***UML Activities in Support of Sustainable Development:
A Report from the Office of the Chancellor, March 2006***

At the University of Massachusetts Lowell, we have long been convinced that a vibrant industrial sector is essential for the development of wide-spread skills that will command jobs and salaries sufficient to facilitate family and community renewal—thus contributing to an overall sustainable regional economy and social well being. The emergence of dynamic, regional industrial enclaves inside and outside of the United States is not a random phenomenon, but rather the result of organized regional actions. Further, the particular conditions that favor or prevent such success remain to be fully understood. Since 2000, UMass Lowell has organized and hosted eight conferences on sustainable regional development. The presentations at these conferences have confirmed that the Lowell campus is regarded as a very significant contributor to such an understanding.

The Lowell campus seeks “to mature and demonstrate the effectiveness of a new model for a public university’s role in the sustainable economic and social development of regions”:

The Lowell Model.

The plan for accomplishing this calls for five major campus efforts:

1. To continue our effort to gain a robust understanding of how regions can sustain their economic and social development in the long term.
2. To play a significant role in assisting our region to innovate continuously.
3. To play a significant role in assisting our region in developing its human resources.
4. To play a significant role in assisting our region to improve its environmental quality and the health of the citizens.
5. To play a significant role in assisting our region in strengthening the vitality of its communities.

Each of these campus initiatives is described below.

- 1. To continue our effort to gain a robust understanding of how regions can sustain their economic and social development in the long term.***

It is not simple to ask, “What conditions allow for some geographical regions to blossom and then enjoy sustainable development, while others blossom for a short time before stagnating and still others never bloom?” Although many investigators have gained insight into the answer to this question, a truly robust understanding has yet to emerge. Without this understanding we cannot assess in full the impact of various national, cultural, political, financial, social, and technological factors on sustainable regional development. Since 1992-93, the Lowell campus has been systematically seeking to gain a comprehensive understanding of this complex phenomenon.

In 1997, the President and the Board of Trustees of the University of Massachusetts approved the creation of an interdisciplinary academic department at Lowell: Regional Economic and Social Development (RESO). Department faculty members collectively serve as a “think tank” for our work on sustainable regional development. Following are examples of campus activity designed to deepen our understanding of the factors that help or hinder a region’s efforts to achieve sustainable development.

- UMass Lowell’s Committee on Industrial Theory and Assessment (CITA) brings focus to an interdisciplinary effort to understand the dynamics of a sustainable regional economy. CITA’s recent activities include:

CITA Books: *Approaches to Sustainable Development: The Public University in the Regional Economy*, published by the University of Massachusetts Press (2001), is a product of research presented at internal working conferences. A newer volume, *Globalization, Universities and Issues of Sustainable Human Development* (Edward Elgar Press, 2002), is based on an international conference hosted by CITA in 2000.

CITA Conferences: CITA alternates internal working conferences, which help develop a common language and research approach across disciplines, with international conferences for researchers and practitioners from around the world. Recent gatherings have addressed “Sustainable Jobs, Sustainable Workplaces” (2005), “Education for Sustainable Development” (2003), “Supporting Public Health and a Healthy Society” (2002), “Diversity, Culture and Sustainable Development” (2001), and “The Role of the University in the Globalizing Economy” (2000).

- Seminar Series: Presented by RESD and the Center for Industrial Competitiveness (CIC), the series showcases ongoing research. Seminars focus on policy areas such as 1) regional collaborations across municipalities; 2) organization, workforce development, and education; and 3) globalization—impacts and consequences. The Fall 2005 series emphasized New England issues: transportation, energy, housing, and water.
- Anticipating Technology Trends (ATT): Prof. Michael Best of the CIC leads this project, which is building a historical database of high tech companies to deepen our understandings of regional industrial specialization, growth, decline, and reinvention. The ATT database includes approximately 60,000 public and private, nationally located high tech producers classified by a finely granulated taxonomy (licensed from CorpTech which also supplies the major company directory) in which 18 industry codes explode to 300 major product codes, and to 3000 minor product codes. The ATT database is a tool to “discover” a region’s competitive advantage and to characterize a region’s underlying technology capabilities, deep craft skills, and cluster dynamics. It is a firm specific, bottom-up approach to conduct technology audits and technology roadmap exercises, to research skill needs, and to anticipate technology trends.
- Analysis of High Tech Industries: RESD Prof. Bill Mass and graduate students are working in collaboration with the UMass Donahue Institute on a project funded by the Economic Development Administration. The CIC component of this project analyzed the high tech industries in the seven benchmark regions. The final report is due in late 2005.
- The Future of ICT Employment: Led by the CIC’s Prof. William Lazonick, this project analyzes the role of business organization in the ongoing evolution of employment opportunities in the U.S. information and communications technology (ICT) industries. By delving into changes in the investment strategies and employment practices of high-technology enterprises that operate in the United States, we are identifying structural changes in the availability of remunerative, stable, and creative jobs for well-educated and well-trained members of the U.S. labor force. This research helps policy makers understand trends in the demand for and supply of high-

tech labor in the U.S., including the structural components of the recent “jobless recovery.”

- Financial Institutions and Innovative Enterprise: This project combines a number of collaborative efforts, each of which seeks to understand the evolving relation between financial institutions and innovative enterprise over time and across the advanced economies. Led by Prof. William Lazonick of the CIC, the project asks how financial institutions influence the innovative strategies and capabilities of business enterprises, with a focus on high-technology industrial sectors. Much of the research focuses on the changing functions of the stock market (control, cash, combination, and compensation) in the industrial corporation and the impacts of these functions on corporate strategy, organization, and finance. Lazonick and Mary O’Sullivan of INSEAD are comparing the U.S., British, and French experiences in a) the evolution of the venture capital industry and b) the financing of the videogame software industry.
- Employment and Regional Development in the U.S. and Mexico: Prof. Chris Tilly of the CIC is leading this project, whose major component to date is entitled “Retail workers on both sides of the border.” With funds from the Rockefeller Foundation and a Fulbright Research Fellowship (for Tilly), the team is pursuing comparative research of how retail restructuring has affected the workforce in both countries. They also have established student exchange programs with two Mexican universities, the Universidad Autónoma Metropolitana-Xochimilco (UAM-X) in Mexico City and the Universidad de las Americas (UDLA) in Puebla, and have begun carrying out exchanges.
- Renewable Energy in New England: Technology, Industry, and Workforce Policies: Prof. William Mass of the CIC is leading the effort to understand the interaction between competitive and policy influences on the pace and direction of technological capabilities, product commercialization, and regional industry growth and performance of renewable energy in New England. The first study focused on workforce development policies related to the photovoltaic industry. Working collaboratively with other centers in the UMass system, current research is examining policy initiatives that can improve on the regional innovation system advancing the renewable energy sector, including solar, wind and related power electronics necessary

to achieve price competitive distributed generation. The CIC activities are developing in collaboration with the UML centers for Sustainable Energy and Electric Car and Energy Conversion, along with the UMass Boston Environmental and Business and Technology Center.

- New England Initiative (NEI): Led by Prof. William Mass of the CIC, the project researches, analyzes, promotes debate and discussion, and provides technical and strategic assistance to better understand the nature of regional challenges and opportunities to advance the quality of life in the region. As a region of states relatively small in area or population, many of the social, economic and environmental dynamics of change are interdependent and cross state boundaries. Working with partners, the NEI provides research and technical assistance, advances common understanding of regional challenges, and identifies better solutions through coordinated and complementary responses. Lead partners with the CIC New England Initiative are the New England Council and the New England Association of Regional Councils. The NEI is also a founding and active participant in the New England Smart Growth Alliance, along with the Lincoln Institute of Land Policy, the Federal Home Loan Bank Board, and Region 1 of the U.S. EPA.
- Industrial Modernization: Country and Sector Studies: Prof. Michael Best has worked with numerous agencies and governments to construct and implement bottom-up programs for production upgrading and technology management. These include the United Nations Industrial Development Organization in Cyprus, Jamaica, Honduras, and Malaysia, the United Nations Development Program in India, the Merrimack Valley Manufacturing Extension Program in Massachusetts, and the World Bank in Moldova. He was on the Advisory Panel for the 1996 Human Development Report of the United Nations.
- Information Economy and Regional Development: The CIC conducts research into the “infocom” industry (the combination of telecommunications and computers through the medium of the Internet) and its relation to the rise of the “new economy.”
- Community Development Work Study Program: This HUD-supported project at RESD places eight graduate students in agencies and organizations where they can assist community development activity. Placements include the City planning

departments in Lowell and Lawrence, the Merrimack Valley Project, Coalition for a Better Acre, Lawrence CommunityWorks, and the UML Center for Family, Work, and Community.

- The Skills Project Gap: RESD Prof. Bill Mass is working with graduate students in coordination with the Donahue Institute on a funded project with the Commonwealth Corporation analyzing skill gaps in the current and projected Massachusetts economy. The first paper is “Will we have the workers our businesses need? Will we have jobs for the workers we have?” Subsequent studies will focus on the health care and life sciences industries.
- Effects of Discrimination at Work: The Center for Women and Work (CWW) and the Kerr Ergonomics Institute (KEI) are engaged in a multi-year collaboration to research the links between discrimination and harassment against women in the workplace and levels of stress, adverse health outcomes, and increased business costs (due to higher absenteeism, increased turnover, lowered productivity, and higher worker healthcare costs). CWW completed a survey of UML non-faculty employees on perceptions of work climate and other factors. CWW researchers also are participating in the PHASE in Healthcare project, a five-year study of the relationship between socio-economic status and health disparities in the regional healthcare industry. Data have been collected on features of workplace climate that have been identified as relevant through the CWW-KEI collaboration and the Profs. Meg Bond/Jean Pyle/Laura Punnett model. CWW Associates are examining the significance of gender concerning working conditions in footwear manufacturing based on studies from Indonesia and the Phillipines (Dr. Pia Markkanen); the design of a pre-apprenticeship model for women entering the construction trades (Dr. Susan Moir); and the challenges faced by deaf women in negotiating education, mothering, and paid work (Dr. Cheryl G. Njarian).
- Women-Owned Businesses: The CWW surveyed women-owned businesses in Greater Lowell as part of broader research on the topic. Findings on the challenges, needs and strategies have been presented, and a directory has been compiled and distributed: *The Greater Lowell Women-Owned Business Directory*.
- Housing Research Project: The Center for Family, Work, and Community has an

extensive engagement with the issue of regional housing needs. Research has been funded by the Sociological Initiative Foundation, CITA Seed Grants, and the Parker Foundation. A Public Forum on Housing presented current housing trends and housing conditions in Greater Lowell. A Regional Housing Summit drew area town, city, and housing authority officials and stakeholders to discuss regional housing issues and potential cooperation.

- Workplace Diversity Initiative: The CWW is using a multiple case study method to investigate concerns within varied workplaces as they strive to increase the diversity of workers at all levels of the organization and enhance the quality of relationships among diverse workers.
- Global Perspectives on Women and Work: Participants in the Gender and Work group of the CWW are engaged in collaborative research with the Swedish National Institute for Working Life. The first project explores why occupational segregation by gender occurs in the U.S. and Sweden and persists in both nations despite differing social policies, laws, and regulations.
- Advancing Prospects for Women in Science and Technology: With a two-year National Science Foundation grant, the CWW will organize a working conference that will gather an intergenerational and interdisciplinary community of racially and ethnically diverse scholars to discuss workplace factors associated with women's success in STEM (science, technology, engineering, and mathematics) fields. Participants will include members of two primary cohorts who have done research on women and science—scholars whose research emerged in the 1960s and younger scholars who began their work in the 1990s. Project WIST will disseminate key lessons from the conference and identify issues for further research and action.
- Action Principles: Co-edited by Prof. Meg Bond of CWW and Shelly Harrell, this special issue of the *American Journal of Community Psychology* (June 2006) includes analyses of “choice points” in research and action work to bridge diverse groups.
- Workplace Chemistry: Addressing Organizational Diversity in the 21st Century: Prof. Meg Bond's book, forthcoming from University Press of New England, summarizes a case study of a manufacturing firm undergoing an organizational change process aimed at increasing diversity.

- Urban Inequality and the Workplace: RESD Profs. Philip Moss and Chris Tilly published two books on issues of urban inequality and the workplace. Moss and Tilly co-authored *Stories Employers Tell: Race, Skill, and Hiring in America*, which examines obstacles to less-skilled minority workers and ways of overcoming these obstacles. Tilly co-edited *Urban Inequality: Evidence from Four Cities*, which combines 11 papers from the historic “Multi-City Study of Urban Inequality,” including three co-authored by Moss, Tilly, or both.
- Project TechForce: Women and Men in Information Technology Workplaces: In partnership with the Massachusetts Software and Internet Council, the CIC and CWW engaged in a study funded by the National Science Foundation and in partnership with the Massachusetts Software and Internet Council to investigate the factors affecting the attraction, retention and promotion of women and men in IT. Project TechForce interviewed 200 men and women in IT.
- The Toxics Use Reduction Institute (TURI): Since 1990, TURI has worked with more than 700 firms in the state to identify ways to reduce toxic chemical use, waste, and emissions. The core group of firms filing annually in accordance with the state’s Toxics Use Reduction Act has decreased its toxic chemical use by more than 40 percent since 1990

2. *To play a significant role in assisting our region to innovate.*

Lacking abundant natural resources and faced with intense global competition, Massachusetts must be able to continuously innovate or the state will face economic decline. To assist our region’s ability to innovate, the Lowell campus has focused on four major activities:

- a. significantly expanding our externally funded research and development;
- b. building a significant Commercial Venture Development Unit (CDVU) on campus;
- c. substantially increasing the number of patents and license agreements; and
- d. create an educational program to support technology commercialization

Each of these focused activities is described briefly below.

- a. Externally Funded Research

Lowell conducts about \$26,000,000/yr. (expenditure) of research and development funded by external agencies. An unusually high percentage is funded by private industry, reflecting Lowell's mission of assisting in industrial innovation. The campus seeks to at least double the externally funded research and development as soon as possible. To accomplish this we will consolidate several existing centers into comprehensive institutes built around single themes.

b. Commercial Venture Development Unit

The CVDU at Lowell was developed primarily to assist this region in the essential task of continuously finding technological innovations that can be successfully commercialized, thus creating a variety of employment opportunities across the workforce spectrum. The CVDU assists in the formation and early-stage start up of enterprises emerging from Lowell faculty's innovative concepts as well as those based on innovative work of non-university personnel. Acceptance into the CVDU is determined by a three-person "investment committee" and is based on an evaluation of the enterprise's team and business plan, as well as its ability to engage Lowell students and faculty. In most cases, UML will accept equity as payment for services. The CVDU provides strategic business advice, identifies and recruits the needed corporate officers, and finds funding for the enterprises. More than 20 companies have participated in the program. Collectively, these firms have raised more than 80 million dollars in investments from seed, angel, venture capital, and traditional banking sources. UMass Lowell has an equity position in these firms ranging from 1 percent to 10 percent. The CVDU is in the planning stage for an expanded operation that would include pilot commercial operations and laboratory capabilities to support a larger number of UML spinouts based on UML innovations.

UMass Lowell maintains close, two-way communication between regional enterprises and the campus. We regularly exchange information on innovations that have a high potential for commercialization. To gain competitive advantage from emerging technologies, companies must draw expertise from multiple disciplines: engineering, science, the social sciences, management, and the arts and humanities. In addition, as the pace of technological change continues to accelerate, companies increasingly look to UML as a primary partner in pursuing research and development initiatives. UMass

Lowell is the only institution that can provide the depth and breadth of experts needed to support interdisciplinary efforts necessary for effectively facing challenges presented by technological advances. The regional research university has become an integral player in maintaining the innovation pipeline critical to local economic prosperity and job creation.

UMass Lowell has been proactive in understanding the direction technology is taking within the region and disseminating this knowledge to companies and statewide economic development agencies. We have been conducting an ongoing research project called “Anticipating Technology Trends” to gain understanding into the dynamics of the regional industrial economy and to provide competitive insight for local companies. Drawing from our strength as a technically oriented university, UMass Lowell researchers are attempting to forecast the path to commercialization of promising emerging technologies. This research will enable innovative regional companies to knowledgeably choose which “next generation” products and services to develop, enabling a reduction of “time-to-market” interval over competitors.

Three significant studies have been undertaken:

Cascade Family of Companies: We have completed an analysis of the 11 telecommunications companies whose heritage can be traced back to the Cascade Communications Company. The study demonstrates the role of technological change in establishing new business opportunities and the importance of experienced management leadership in capitalizing on these opportunities.

Analytical Instruments Industry: Supporting an initiative by the Northeast Regional Competitive Council and Secretary of Economic Development Ranch Kimball, UMass Lowell conducted an analysis of analytical instrument companies in northeast Massachusetts. The study examined the existing customer base of these companies and identified opportunities for crossover applications in non-traditional areas. Growth opportunities for these companies are anticipated if they expand their product offerings into biomanufacturing and process control areas.

Interoperable Communications Networks: Supporting an initiative by the Merrimack Valley Economic Development Council and the Northeast Regional Competitiveness Council, the Lowell campus is currently analyzing regional companies that offer voice,

data, and video wireless communication products. The study will serve as the basis for constructing a multi-community inter-operative network for homeland security applications. It is funded by the Massachusetts Technology Collaborative.

The Massachusetts industrial economy continues to be dependent upon leadership in implementing unique, hard-to-imitate technological capabilities. Historically, growth has been sustained through the Commonwealth's ability to commercialize emerging technologies, creating new markets and enabling efficiency or productivity gains in the process. Upswings in regional business cycles can be directly attributed to leadership in the application of next generation technologies. Because the development of new industrial capabilities requires time for workforce training and acquisition of capital facilities, companies can benefit from the ability to predict which technologies will lead the next round of economic growth. Such information will give progressive companies valuable time for orderly deployment of these technologies into advanced products or processes.

UMass Lowell is not only proactive in disseminating information regarding technology trends, but also in making known significant research work in the physical and life sciences, in particular activities in the Nanomanufacturing and Biomanufacturing Centers. Numerous meetings have been hosted involving university administrators, researchers and executives of regional companies. Most significant were exchanges with Acopia Networks and Avici Systems (storage and communications technology), Intel Hudson and Physical Sciences Incorporated (remote sensor technology), Microfluidics and MKS Instruments (biopharmaceutical processes), Triton Systems (drug delivery), and Proctor & Gamble (consumer products). With Secretary Ranch Kimball, UMass Lowell co-hosted a nanotechnology industrial conference for company executives, which focused on competitiveness of this emerging industry within Massachusetts. Each of these meetings has facilitated the exchange of information and established collaborative relationships that ultimately will lead to business growth and greater economic prosperity within the region.

Regarding nanotechnology, UMass Lowell won a \$12.4 million NSF grant to establish the Center for High-Rate Nanomanufacturing in collaboration with Northeastern University and the University of New Hampshire. The Center will conduct research on

tools and techniques for manufacturing at the nanoscale. The research is expected to be useful for the more than 170 companies in Massachusetts that have products or are interested in developing products that incorporate nanotechnology. These companies employ about 30,000 people and generate more than \$5 billion in revenue. The Commonwealth committed \$5 million in matching funds for this work through the John Adams Innovation Institute.

UMass Lowell continues to be proactive in offering educational programs, conducting research and partnering with local businesses to help drive regional growth through technology deployment. The primary mission of the university remains firm: the education of students. However, in the “knowledge economy” a secondary mission of the university is rapidly emerging, serving as a catalyst for industrial growth. UMass Lowell understands the opportunities this change brings and has been very active in strengthening partnerships with companies, economic development agencies, and other universities both in the exchange of ideas and the dissemination of research findings.

c. Increase the Number of Patents and License Agreements

Due to a provision in the state’s conflict of interest law, until 1996 public higher education faculty in Massachusetts could not benefit financially from their own intellectual property associated with their employment. Through legislation passed in 1996, an exception was provided to public higher education faculty.

Following is a comparison of the patent and license agreement activity on the Lowell campus for a 30-year period ending in July 1996 with the period starting in July 1966.

30 Yr. Time Period–Oct. 1966 through July 1996

(up to the end of restrictions)

- | | |
|---------------------------------|---------------------------|
| ▪ Number of patents | 31 or an average of 1/yr. |
| ▪ Number of licenses negotiated | 1 |

After July 1996

In recent years, after the exception was granted, UML faculty members have been awarded about 13 patents per year. The innovations associated with these patents are made available by the campus to companies who agree to royalty payments.

d. Create an Educational Program to Support Technology Commercialization

The College of Management, Commercial Ventures/Intellectual Property unit (CVIP), and CVD launched a pilot program to teach new venture creation at the graduate level. In its initial phase, the program leverages the existing capstone course in the graduate program in management, in which students develop business strategies for emerging technologies, by introducing UMass innovations as case studies. Simultaneously, graduate students from all other disciplines are taught the tools and methods applied to the creation of a new company, with an underlying focus of sustainability. When these two populations are combined in an interdisciplinary practicum, the objective is to transform UMass innovations into “investable” entities. In addition to adding value to the UMass inventions, our students enhance their portfolio of academic accomplishments, completing their studies better prepared to make significant contributions to our innovation economy. The program is known as the UMass Commercialization Lab; a Certificate in New Venture Creation is offered as part of the program.

3. *To play a significant role in assisting our region in developing its human resources.*

To assist in the development of our region’s human resources the Lowell campus has focused on three major activities:

- a. support and partner with our region’s teaching corps, principals, superintendents, and concerned political/civic/parent groups;
- b. secure the needed professional workforce by facilitating the development and implementation of regional cooperative “farming” strategies to replace “hunting” strategies for our region’s businesses; and
- c. significantly expand Continuing Education/Corporate Studies.

Each of these three major activities is described below.

a. Support and partner with our region’s teaching corps, principals, superintendents, and concerned political/civic/parent groups.

An educated citizenry is a key factor in regional success. To be innovative and to allow for continual renewal in economic and social spheres, any region needs knowledgeable people who have the capacity to be creative. Correspondingly, it is vital that the economic value of the intellectual property created locally is harnessed for the benefit of all.

UMass Lowell is deeply committed to developing human capital in its region and by extension in the state. We support dozens of programs that assist K-12 education and work closely with local school systems. The partnerships are comprehensive and long-term. There are numerous programs for students and many professional development opportunities for educators. Our outreach programs have more than 100,000 interactions with elementary, middle, and high schools students annually and more than 12,000 teachers each year.

The state Education Department reported that 100 percent or very close to 100 percent of UMass Lowell's teacher certification test-takers passed the entire test. Our faculty and administrators work closely with local teachers, principals, and superintendents in order to understand the evolving needs of surrounding communities. The Lowell campus customizes its outreach efforts so that they are effective and timely. The dialogue also allows for quick response by our personnel to new developments spurred by internal or external factors. The following list of programs for (A) students and (B) educators demonstrates the depth of our involvement with our region's schools.

A. INITIATIVES WITH STUDENTS IN GRADES K-12

- College Prep brings 150 Lawrence High School students to campus for academic enrichment, internships, and recreational programs for a 6-week summer program, and 45 each Saturday during fall and spring. Young Scholars involves 40 middle school youth from Lawrence in pre-secondary science and math study.
- The Demonstration School/Bartlett Community Partnership School: Lowell's long-time model trilingual "Demonstration School" (English, Spanish, Khmer, pre-K to 5), a partnership between the City and UML, has evolved into the Bartlett Community Partnership School. The school is a professional development school of the university where teacher preparation classes and clinical experiences are conducted at the school in partnership with the Bartlett's teachers. UML faculty, staff, and students also

volunteer time and resources to provide extended day programs for Bartlett youth.

UMass Lowell is also targeting two other public schools in Lowell's Acre neighborhood and Lowell High School as the focus of its resources and collaborative work with the public school system.

- Dual Enrollment offers advanced high school students college courses in math, science, and language, earning them both high school and college credit. In Fall 2005, nine Lowell High School students are enrolled in the program at no cost to the students due to a partnership with UML. Four students from other high schools are participating at their own expense. The loss of state support for this program led to a decline in participation.
- Design Camp is a weeklong, campus-based summer program in hands-on engineering for students entering 6th through 9th grades. Since 2000, Design Camp has served approximately 1,000 students. In 2005, 330 students filled 385 camp seats, including 15 high school interns who volunteered as teaching assistants and 20 who took part in the new Design Camp High School Pre-Engineering Program. Since 2003, we have offered Designlab, an after school engineering workshop for middle school students. We have trained 20 middle school teachers from Lowell and other communities to direct the workshops (using NSF ASCEND funding). By the end of 2005, nearly 800 students will have been served in the after school program (300 on campus and 500 in their schools). In addition, our high school Assistive Technology Design Fair attracts students statewide; last year nine high schools and 130 students were involved in 34 design projects. This year, more than 20 schools have expressed interest.
- First LEGO Robotics League Tournament: Provides hands-on experience in engineering and computer programming to children aged 9 through 14.
- Focus on Mathematics: UMass Lowell collaborates with Boston University, WPI, Lesley University, and several public school systems in Massachusetts, including Lawrence, on this National Science Foundation-funded Mathematics and Science Partnership. The program offers mathematics teachers solid, content-based professional development, provides students with rigorous courses and curricula, develops and supports a cadre of mathematically expert teachers who share their knowledge with

colleagues and students in their districts, and establishes a community in which mathematicians, educators, and administrators work together with students to put rigorous mathematics at the core of the learning experience.

- GEAR UP (Gaining Early Awareness and Readiness for Undergraduate Programs): Supported by a six-year, \$3,475,200 grant from the U.S. Dept. of Education, this program of the UML Center for Family, Work, and Community links 800 low-income students at five middle schools in Lowell and Lowell High School to education, mentoring, and information services on campus and in the community. This renewal of GEAR UP follows a successfully completed five-year, \$4.3 million program.
- Healthy Life Skills An evaluation consists of analyzing pre and post tests given to students in kindergarten, 4th, 8th, and 10th grades in the Lowell school system in order to evaluate the comprehensive health education curriculum.
- High School Academies: The Graduate School of Education and Center for Field Services and Studies are working the Lowell High School administration to design a new academy effort that will involve all 10th through 12th graders by Fall 2006. We are also advising the Lawrence School Superintendent on the small schools that will comprise the new building set for a Fall 2007 opening.
- Instructional Network offers an interactive television connection between UMass Lowell and public schools in 15 K-12 districts, and provides distance learning opportunities that allow high school students to take college-level courses.
- JETS Competition: Sponsored by the Junior Engineering Technical Society (JETS), this program offers engineering, mathematics, and science aptitude tests to students from more than 20 schools across the state for qualification in regional and national competitions.
- Lowell All-City Youth Wind Ensemble is a challenging 15-week community outreach activity for 60 high school designed to enhance the cultural offerings of the Greater Merrimack Valley. High school students play college-level literature alongside UML music students.
- Mary Jo Leahey Summer Band Camp: A residential, musically intensive honors band camp for instrumentalists in grades 9 through 12. Each year, 100-115 student musicians participate in classes such as Concert Band, Honors Wind Ensemble, Jazz

Improvisation, Conducting, Sound Recording Technology, Big Band, and Small Jazz Ensemble.

- Merrimack River Watershed Education Project: Involves 55 schools in two states in water analysis and data sharing.
- Multimedia Curriculum Enrichment provides a computerized science vocabulary that supports Biology courses at Lowell High School.
- National Engineering Design Challenge: High school teams compete to design, build, and demonstrate a working model of a new product.
- National Youth Sports Program: [The Congress eliminated federal funding for this program in 2004.] For 14 years, UMass Lowell sponsored the NYSP. The Lowell program was twice awarded the Silvio Conte Award for Excellence, the top national award for NYSP. Each summer, 350-400 boys and girls (aged 10 – 16) spent five weeks on campus, participating in sports activities and education programs to encourage a healthy lifestyle, to become better citizens and to acquaint them with career and educational opportunities. Ninety-seven percent of the participants lived in census tracts that met Federal poverty guidelines. The youths received instruction in math and science, personal health, substance abuse, and more, along with their athletic activities. Children who may otherwise be without role models from higher education background were exposed to the resources and opportunities available on a campus near their home.
- New Horizons prepares 90 economically disadvantaged and minority Lowell High School students for college with subject tutoring, counseling, and information on the application process.
- Nuclear Reactor/Radiation Laboratory provides guided visits and remote broadcasts for area students. A new Web-based system for remote outreach and education is available.
- Partnership for College Success: UMass Lowell's Center for Family, Work, and Community and Lowell High School received a five-year "Partnership for College Success" grant of \$150,000 each year directed towards maximizing the number of Lowell High School students who graduate from high school and earn degrees at UMass Lowell and other colleges. This is a new grant program under the Nellie Mae

Education Foundation's *College Prep* initiative. The Woodrow Wilson National Fellowship Foundation will provide technical assistance as the intermediary for the program.

- River Ambassadors Program: A leadership and environmental program for 70 high school students in Lowell.
- Ropes Course: An outdoors experiential program that has served over 2,000 youth and adults from local and regional schools, including Lowell public schools, and is designed to build stronger, more effective teams.
- Science/Technology Early Outreach enables up to 20 middle school students each semester to conduct guided research in electronics.
- SMARTS, In its 19th year, Students Meeting the Arts (SMARTS), an initiative of UML's Center for the Arts, offers high quality performing arts experiences to 35,000 K-8 students from Massachusetts and Southern New Hampshire. The Center for the Arts seeks funding to subsidize tickets for Lowell schools, to help ensure that all students can experience the performing arts. Also, the Center for the Arts coordinates a partnership with the Shaughnessy School of Lowell and the John F. Kennedy Center for the Performing Arts in Washington, D.C., for the purpose of identifying and using arts resources to meet the school's educational needs. The Center for the Arts provides professional development for Shaughnessy School teachers and programs for students.
- String Currents: This is a collaboration of musical talent from the University's faculty artists and gifted student instrumentalists in performance with established metropolitan area professional musicians. String Currents promotes music by American composers who represent the cultural diversity in our society.
- The UML String Project: This collaborative after-school program on campus provides in-depth string training to elementary school students from the Lowell Public Schools. UML recruits students from the breadth of cultural, socioeconomic, and ethnic backgrounds, benefiting a school population that is 56 percent minorities. In 2001, UML was chosen through a nationwide competitive process to join the National String Project Consortium. Our groundbreaking ten-year program is unique in Massachusetts. Children receive high-quality string instruction, discover different types of music, and perform free concerts. The program has 125 students from 23 elementary and middle

schools in Lowell. In 2005, a satellite program was started at the Bartlett School as part of an Arts Extension Program developed by the Graduate School of Education.

- Take All Our Daughters to College Day is a college enrichment day for 100 eighth-grade Lowell girls from ethnically diverse backgrounds who have no family experience with college.
- Technical Assistance on Competitive Projects provides science fair judging and other help on request.
- Toxics Use Reduction Institute develops curriculum for school use.
- Tsongas Industrial History Center (TIHC): This center provides hands-on activities and tours of Lowell as a Classroom, supplemented by in-school presentations, to an average of 60,000 teachers and students per year. More than 750,000 students have been served in the Center's 14 years. Some 4,000 Lowell students in grades 3, 8, and 9 visit TIHC as part of curriculum-based programs. With funding from the Institute of Museum and Library Services and the Massachusetts Environmental Trust, TIHC created a Greater Lowell Regional Environmental Education Alliance, which sponsors Earth Day activities, supports Lowell Clean Up, and re-instituted a Youth Watershed Education Conference.
- Women in Science and Engineering (WISE) is a day of hands-on and interactive workshops for middle school girls led by professional women scientists and engineers.
- Young Scientists Program offers student-led health and science activities for young girls at Girls Inc.

B. PROFESSIONAL DEVELOPMENT FOR EDUCATORS

- American Chemistry Society Broadcasts: UML hosts interactive broadcasts for educators.
- Arts Bridge: Provides teachers professional development workshops on motivating K-6 students through the arts.
- Colloquium on Research in Mathematics and Science Education: This annual event at the Graduate School of Education focuses on the links between theory and practice in K-16 education.
- Deans Meetings: UMass education deans plan together for K-12 and higher education programs.

- Educational Administration Online: This program for prospective school principals in Lawrence involves 15 educators working together to prepare for school leadership in an urban setting. The original 25 teachers in the program completed their program in 2004.
- Guidance Counselor Professional Development Day: Offers programming for guidance counselors concerning public higher education in Massachusetts.
- Haverhill Public Leadership Project: Provides targeted professional development for prospective school leaders in the district.
- IDEA: An electronic educational bulletin board for teachers and some public agencies.
- Greater Lawrence Technical School Partnership: Provides strategic planning and leadership development for the administrative team at this large, urban school.
- The Lowell Program: A collaboratively designed professional development program for Lowell teachers leading to a master's degree in urban education.
- Lowell Regional Physics Alliance: Provides support and information in a forum for high school physics teachers.
- Mentor Teacher Training Program: Prepares more than 100 mentor teachers from districts throughout northeastern Massachusetts every year.
- Nuclear Science and Engineering Radiation Workshops are provided to high school science teachers annually.
- Science On Line: A collaborative project funded by the National Science Foundation and led at Lowell by Prof. Anita Greenwood.
- Superintendents' Forum: Enables district leaders from 20 communities to meet bi-monthly for issues discussion.
- Teaching American History: With a \$960,000, four-year grant from the U.S. Department of Education, the Tsongas Industrial History Center and the Social Studies Teacher Education Program at the Graduate School of Education, with support from the Center for Field Services and Studies, have worked intensively with Lowell 5th and 8th grade teachers to strengthen the teaching of U.S. History in the Lowell public schools.
- Tsongas Industrial History Center (TIHC): About 300-400 teachers annually participate in graduate level workshops ranging from one day to one week at the

Tsongas Industrial History Center, funded by the U.S. and Massachusetts Departments of Education (History and Physical Science), the Museum Institute for Teaching Science, the National Groundwater Institute, and the Massachusetts Environmental Trust. The Center provided an online graduate course in strategic educational planning for 25 Education Rangers in parks in the northeast region.

b. secure the needed professional workforce by facilitating the development and implementation of regional cooperative “farming” strategies to replace the “hunting” strategies for our region’s businesses.

Former UML Dean of Engineering Krishna Vedula noted in the late 1990’s that faced with the periodic severe shortage of engineers our regional enterprises resorted to becoming aggressive “hunters” rather than “farmers.” They “hunted” in the limited pool of regional engineers at the direct expense of other regional enterprises, thus limiting regional development, rather than banding together to “grow” or “farm” a steady regional supply equal to demand.

The Lowell campus has focused on the implementation of long-term “farming” strategies in engineering, information technology, computer science and other economically critical areas by developing strongly interactive three-member partnerships with K-12 systems on one side and regional enterprises on the other side. The aim of these partnerships being to motivate, encourage and support K-12 students so that they can develop their full potential.

John Hodgman, the former president and chief executive officer of the Massachusetts Technology Development Corporation, was named the first Howard P. Foley Professor at UML in 2002. Hodgman coordinates efforts by business, academia and government to promote mathematics and engineering in schools. The professorship is a non-teaching position, endowed by the Mass High Tech Council.

The Northeast Network STEM Pipeline Project is one of seven partnerships in Massachusetts charged with addressing the need to increase the number of qualified young people choosing careers in science, math, engineering, and technology, or STEM, fields. This mission is driven by the need for the Commonwealth to increase its technology talent pool in order to remain competitive in the global innovation

economy. With grant funding from the Commonwealth of Massachusetts Pipeline Fund, administered by the Board of Higher Education, the Northeast Network, led by UMass Lowell's Graduate School of Education, has enlisted six higher education institutions, seven school districts, three Workforce Improvement Boards, and businesses in Middlesex and Essex counties to work together on improving student performance, knowledge, and interest in STEM.

A related effort is the Northeast Higher Education Partnership, a collaborative of seven colleges and universities in which members work on projects of mutual interest and tap into the diverse resources of member schools.

c. Significantly expand Continuing Education/Corporate Education.

If you make the assumption that the young-adult (33 year-old people) in-migration to Massachusetts will only equal the young adult out-migration up to 2009, and then the size of the 33-year-old population in this state will be about 40 percent smaller in 2009 than in 1992. Historically, we have depended significantly on this young-adult population to earn advanced degrees, gather practical experience, and perform at the leading edge of their various activities and fields. While this decline takes place we most likely will continue to see a substantial decrease in the length of time an enterprise or an entire economic sector can expect a new product or service to remain in significant demand before it is replaced or overshadowed by yet again a new or greatly improved technology application. Clearly, if our region is going to remain innovative and thus competitive in the next decade and beyond, we need to counter this decline in young adults by noticeably expanding and improving the effectiveness of our overall workforce skill development and job retraining, including full use of new technology. Based on this decline in the young-adult population and an additional decrease in the product/service market life cycle time, we have concluded that UMass Lowell will need to approximately double the upgrading education/training (corporate education) that we had been supplying in the early to mid 1990's to the regional workforce. Otherwise, we will not be able to meet competitive requirements of the workforce. A significant portion of the corporate education (on-site and electronically delivered at a distance)

will necessarily involve cutting-edge instructional technology and combined instruction by campus faculty and practicing professionals outside of the University.

4. To play a significant role in assisting regions to improve their environmental quality and the health of their citizens.

In the last analysis the robustness and sustainability of the region's economic enterprises rest with the functional ability of the workforce. Understandably, the first thought turns to education and training of the region's workforce. No less important is the health of the workforce.

The quality of health of the workplace and in the region is an overarching concern, and the issues are self-evident. If the challenge is not addressed thoughtfully and comprehensively, the direct financial loss seen in lost wages and lost productivity, as well as the wrenching social cost to individuals, families, and community will greatly harm the regional economy. The relationships between community health and the education and social development of our children are well known and critical to attaining a renewable, sustainable, robust economy.

In April 2004, UML established the School of Health and Environment at to promote human health and development that enable people to live in safe and productive communities and environmentally sustainable economies. The new school brings together the University's long tradition of educating health professionals with an institutional focus on environmental and economic health. The school includes the departments of Clinical Laboratory and Nutritional Sciences, Community Health and Sustainability, Nursing, Physical Therapy and Work Environment.

The School was created to advance a bold new vision of human health that links individual wellbeing to healthy communities and balanced ecosystems. This innovative initiative combines outstanding teaching and research, a public university's commitment to community service, proven success in interdisciplinary problem-solving, and a 21st-century vision of health and sustainability. Through its degree programs in healthcare, the elimination of health and environmental hazards, and social change, the School prepares graduates with real-world skills and a deep understanding of health and society.

In order to assist this region in particular and regions in general to maintain the quality of their environment and the health of their citizens, the Lowell campus has and will continue to focus on three major activities:

- a. developing and implementing an Environmental Management System Program which can serve cities and town by education, training and support activities. The aim of this program is to disseminate innovative approaches and “best practices” and enable cities and towns to have their environmental practices and standards certified;
- b. continuing the long-term development of our Department of Work Environment and expand its collaborative programs nationally and internationally; and
- c. bringing about the coalescence of a number of our centers and institutes around the theme of “Engineering Healthy Regions” by focusing on food processing, internal and external environmental exposures, and longitudinal regional studies.

Some examples of this effort follow:

- The New England Consortium (TNEC) is region’s model worker health and safety training organization. Since 1987, TNEC has delivered Hazardous Waste Site Operations and Emergency Response training to over 15,000 workers. TNEC is one of 20 national programs administered by the [National Institute of Environmental Health Sciences](#) (NIEHS). In collaboration with UML’s [Department of Work Environment](#), TNEC draws upon a wealth of worker health and safety knowledge. Courses meet or exceed the OSHA 1910.120 standard for protecting hazardous waste workers and employees who respond to hazardous material emergencies in their workplaces. Upon completion of each course, students receive a certificate and a wallet card that document their training. For 15 years, TNEC has provided dynamic hands-on, participatory health and safety training. With simulated work tasks and mock incidents, students gain a better understanding of work site hazards and how to properly respond in an emergency situation. In addition to the open enrollment curricula, TNEC designs trainings to address the needs and hazardous materials specific to a client’s work site. Courses are delivered at UMASS Lowell on site.
- Assistive Technology in the College of Engineering: Since 1991, engineering students have been working closely with disadvantaged persons on projects designed to

assist them in meeting challenges in their lives. Projects require adaptation to the existing technology or design of new devices to meet the specific needs of a disabled person. Requests for these devices come to the Department of Electrical Engineering from Special-Care institutions, Rehabilitation Facilities, and Private Individuals across New England. Projects serve the needs of disabled individuals and clients from organizations such as the Franciscan Children's Hospital, the Perkins School for the Blind and Citizens Leagues for Adult Special Services.

- Health Disparities among Healthcare Workers: Promoting Healthy and Safe Employment (PHASE) in Healthcare: A multidisciplinary team is studying the impact of the healthcare industry work environment on workers' health. The healthcare industry workforce has substantial variability in socioeconomic status, includes many women and members of minority communities, and is exposed to a variety of known health and safety hazards at work. The principal aim is to examine physical and social/behavioral risks and the complex pathways that produce health status disparities in the healthcare workforce. Outreach activities were carried out at the partner facilities to inform employees about the study and to encourage them to participate in various research activities. In addition, UML participated in a two-day educational fair where NIOSH fact sheets about violence in the workplace, needle stick injuries, musculoskeletal disorders and OSHA right to know were handed out to employees, residents and their families. UML offered both educational and training opportunities and technical assistance to project partners. A "Menu for a Healthy Work Environment" was developed, including training workshops from which participating facilities could choose. More than 150 workers participated in sixteen on-site workshops on leadership and management; stress management; workplace violence; and other topics. PHASE researchers also have conducted an ergonomic assessment of the laundry area in a long-term care facility, ergonomic evaluations of hospital staff work stations, and assisted a hospital in developing a required laboratory ergonomic plan. PHASE also organized three healthcare conferences, bringing attention to the health, safety, and diversity support needs of healthcare workers.
- Worker Exposure to Metal-Working Fluids: A continuing major study on worker exposure to metal-working fluids by the Department of Work Environment has

identified increased risks of several digestive cancers and respiratory disease. The objective of the study is to identify the specific agent or agents in the machining fluids which are causing the elevated cancers, in order to make a more accurate assessment of risk. Recent articles on this topic by UML researchers have appeared in the *Scandinavian Journal of Work Environment & Health* and *Applied Occupational and Environmental Hygiene*.

- Asthma and Respiratory Diseases: Prof. Don Milton of the Department of Work focuses on respiratory health and aerobiology including endotoxin, asthma, and airborne infectious diseases. Recently his team has studied manufacturing workers exposed to complex mixtures including endotoxin. Concerning home and office environments, ongoing studies are examining whether endotoxin plays a role in respiratory disease at levels much lower than encountered in the industrial environments. Other studies are examining whether the non-specific building related symptoms (sometime referred to as sick building syndrome) are associated with levels of gram-negative bacteria or endotoxin in office buildings. Regarding biodefense, Milton is testing the effectiveness of ultraviolet light as a means of disinfecting pox virus aerosols. This work will have important implications for constructing effective defenses against bioterrorism in the case of an attack using communicable respiratory infectious agents such as smallpox or genetically modified influenza.
- Dorchester Occupational Health Initiative: Dr. Lenore Azaroff of the CWW assesses hazards and develops potential solutions related to the work of floor sanders, cleaning workers, manufacturing workers, and nail salon technicians. This project Cape Verdean Community Unido, Viet-AID, MassCOSH, and New Ecology Inc., and the Bowdoin Street, Codman Square, and Dorchester House Health Centers. Dr. Azaroff also is examining the role of gender as an influence on exposure to hazards and access to preventive and curative services for the study populations.
- Noise and Silica in Construction: Work Environment Department Prof. Susan Woskie and researcher Susan Shepherd are assessing the effectiveness of different tools in reducing workers' exposure to respirable silica dust and to noise during concrete chipping.

- Strengthening the Capacity of Health Professionals: Serving Minority and Low-Income Communities to Better Identify, Manage, and Prevent Environmental Health Risks: This project focuses on health professionals who serve low-income, immigrant/refugee and minority children in small cities and rural areas in New England, a population that is generally underserved by children's environmental health capacity building efforts although it suffers disproportionately from the impacts of environmental contaminants. UMass Lowell works with community health centers, community health educators, school nurses, emergency department staff, and public health nurses as they have an increasingly important role in identification and prevention of environmental risks at the community level.
- EPA Performance Indicators: The Lowell Center for Sustainable Production (LCSP) is working under a five-year cooperative agreement with the U.S. Environmental Protection Agency's Office of Sustainable Ecosystems and Communities to review the characteristics of sustainability and determine the best indicators to measure it.
- Environmental Management Systems (EMS) Consortium: The EMS Consortium provides training, peer mentoring, on-site consultations, auditing services, Web resources, and software applications to businesses, universities, and other institutions. Consortium partners include The EMS Service Program, designated by EPA as a member of the PEER Center network; EMS WebWare™, a web-based software application developed by UML, the Toxics Use Reduction Institute (TURI), and LCSP.
- Education, Research, and Dialogue on U.S. and Global Chemicals Policies: The project goals are to understand the implications of recent chemicals policy initiatives in the European Union and globally for U.S. companies; provide training for businesses on how to prepare for upcoming European chemicals policy changes that will affect their operations; and continue a dialogue with stakeholders on integrated chemicals policy and innovative policy options for the U.S and other countries.
- Analysis and Support for Regional Action on Asthma: In light of emerging research on the effectiveness of environmental interventions in reducing symptoms of asthma, the Environmental Health Initiative of the LCSP is working with the New England Asthma Regional Council, hospitals, and third party payers to examine the

health and financial benefits of interventions that help reduce asthma exacerbations, identify more effective approaches to disseminating the results of timely research, and improve access to environmental interventions. The LCSP is also working with the Boston Public Health Commission and eleven community health centers to develop and implement a registry that enhances the information available to clinicians, public health officials, and researchers

- Synthesis of Research on Cancer and Environment: For the Collaborative on Health and Environment, the LCSP prepared a report summarizing the literature on links between environmental exposures and a range of cancers. LCSP also provides expertise to the CHE Workgroup on Cancer and Environment.
- Needlestick Injuries and Surveillance among Home Healthcare Workers: Project SHARRP of The Sustainable Hospitals Program has a four-year grant from the National Institute of Occupational Health and Safety (NIOSH) to conduct research that will help protect the rapidly growing population of home healthcare practitioners from risks due to needlestick injuries and blood exposures. The project involves collaboration with the Massachusetts Department of Public Health, three home healthcare agencies, and two labor unions.
- Sustainable Hospitals Program Clearinghouse: Technical support is provided for healthcare practitioners to identify and use safer products and practices.
- The Solutions Exchange Brokerage: With foundation funding, the LCSP is developing mechanisms and infrastructure to foster and support partnerships between environmental advocacy organizations and the business/academic experts who are researching technical and policy solutions to complex environmental and public health problems.

5. To play a significant role in assisting our region in strengthening the vitality of its communities.

In general, but certainly for our region, sustainable development depends on business enterprises being able to combine technological, organizational and managerial innovation and investment capital to produce high quality/low cost products or services that can compete in the global economy. To succeed, these businesses must draw on

and depend on the resources of the region's communities, particularly the human and social capabilities. Thus regional development, if it is to be sustainable, must be supported and nourished by socially vibrant communities. To help our region in this activity, the Lowell campus has emphasized three major activities:

- a. assisting in enriching the cultural, entertainment, and recreational opportunities for all citizens of the region;
- b. assisting and supporting newly arrived citizens to integrate into the region's social, political and educational activities; and
- c. assisting the region's communities in assessing their social strengths and weaknesses and helping design the implement strategy to improve the latter.

Some examples of this effort follow:

- Nationally Recognized HUD Program: UMass Lowell was named as one of nine schools nation-wide demonstrating "the most highly institutionalized approach to outreach and community partnerships overall" by the U.S. Department of Housing and Urban Development (HUD). The accolade appeared in HUD's June 2002 final report, "Lessons from the Community Outreach Partnership Center Program," and was based largely on the achievements of the University in the City Scholars program developed by the Center for Family, Work and Community. Through this program, the University provided funding each year for 10 faculty members to support urban revitalization through innovations in curriculum, community-based research, or outreach and technical assistance. Scholars have come from many disciplines, including English, health and clinical sciences, business, engineering and psychology.
- Service Learning Integrated throughout a College of Engineering (SLICE): UML recently received one of six new service learning grants nationwide from the National Science Foundation. The \$1 million grant will help the college implement service learning projects in every engineering department, activities ranging from assistive technology projects for the disabled to designing solar-powered light and water systems to Peru villages. UML has the nation's only engineering program in which every engineering student participates in service learning.

- Lowell Arena Commission: Through the Commission, the University participates in oversight of the Paul E. Tsongas Arena and Edward LeLacheur Park, both of them active civic facilities used for campus athletics, minor-league sports, entertainment events, conventions, and other civic activities. UMass Lowell was a partner in the development of both facilities, which have raised the city's profile as a cultural and sports hub in the region.
- In the Community's Hands: Planning for a Sustainable Lowell: Sponsored by the Center for Industrial Competitiveness, the Center for Family, Work and Community, and the Loka Institute, the project was intended to enhance the preparation of a new city master plan. With this project, Lowell became the first city in the United States to employ the "scenario workshop" participatory planning approach that draws on the collective experience and imagination of a community. More than 70 people from government, the business sector, the neighborhoods, community organizations, and education collaborated on a vision and action plan for Lowell's future. Most of the products of the plan were incorporated into a new 20-Year Comprehensive Master Plan, including a chapter on sustainability. At the request of City planners UMass Lowell recently completed a study of sustainable/green municipal buildings in 21 U.S. cities. In Spring 2006, UML will facilitate a community process leading to a public forum at which participants will discuss recommendations on steps the City should take to encourage more sustainable construction and redevelopment practices.
- Community-University Advisory Board: The Center for Family, Work, and Community facilitates the work of this board, which offers UML an open channel of communication and vehicle for community collaboration.
- Community Partnership Clearinghouse: Under the direction of the Provost's Office, this initiative provides a means of linking community requests for volunteers, interns, practicum students, faculty assistance, and other support with student, faculty, staff, and campus offices, centers, institutes, and organizations.
- WUML Radio: The campus radio station, WUML-FM, 91.5, broadcasts a weekday morning news and information program (*Sunrise*), along with many hours of locally produced ethnic and community programming each week. Student music programs fill out the schedule.

- The New England Orchestra (NEO): Founded and directed by Prof. Kay George Roberts, NEO is Lowell's first professional chamber orchestra. The mission is to create a vital artistic partnership with the Greater Lowell community. NEO wants to preserve the best of the local tradition, as with the inaugural Chadwick Festival, but also explore new possibilities. Future programs will emphasize a celebration of Hispanic, African-American, and Asian heritage in classical music. Plans are underway for the U.S. 2006 premiere of the American-Cambodian opera, "Where Elephants Weep."
- Community Cultural Programs: The University supports a wide array of cultural activity in Lowell and the region, which provide experiences for hundreds of thousands of students, residents, and visitors. Among the programs in which UMass Lowell is a partner are the Patrick J. Mogan Cultural Center (a joint program of Lowell National Historical Park and UMass Lowell with museum exhibits, cultural activities, a research library, and a Scholar-in-the City program), Lowell Folk Festival, Bread & Roses Heritage Festival of Lawrence, Merrimack Repertory Theatre, Lowell Summer Music Series at Boarding House Park, Moses Greeley Parker Lectures in Lowell, Cultural Organization of Lowell, Lowell Heritage Partnership, Lowell Celebrates Kerouac!, and the City of Lights festival.
- Kerouac Center for American Studies: Supports and extended the community programs about the life and literature of Lowell's best known author and one of the 20th century most important novelists. Directed by Prof. Hilary Holladay, the programs include a biennial conference on Kerouac and Beat Literature, a Kerouac Writer-in-Residence, Kerouac scholarships for creative writing and literary criticism, and other public programs.
- City Lives: An interdisciplinary project of the English and Art departments in which students document through interviews and photography people in Lowell.
- Cultural Planning and Development: UMass Lowell in recent years co-sponsored and hosted two community planning forums for cultural development (*2001: A Cultural Odyssey* and *Sustaining Lowell's Cultural Industry, 2004*), both of which provided opportunities to update the *Lowell Cultural Plan*, the city's master plan for cultural development. In 2005, the University participated in the Mayor's Task Force on

Cultural Assets, whose mission is to identify ways and means to sustain Lowell's cultural sector.

- Destination World: In collaboration with the City of Lowell and others, UMass Lowell is a lead partner in this monthly, world culture film series and arts expo in downtown Lowell. In 2005, the project proposal ranked first in the state and received the largest individual grant (\$75,000) from the Cultural Economic Development program of the Massachusetts Cultural Council.
- Discovery Series: The UML Center for the Arts features professional, nationally and internationally known performing artists on five Sundays from October through May. The 2005-06 series include the Shangri-La Acrobats, Tom Chapin and Friends, and The Russian/American Kids Circus.
- Greater Lowell Community Foundation: UMass Lowell faculty and staff provide support for the annual Philanthropy Day conference as well as regular operations for this key community organization.

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