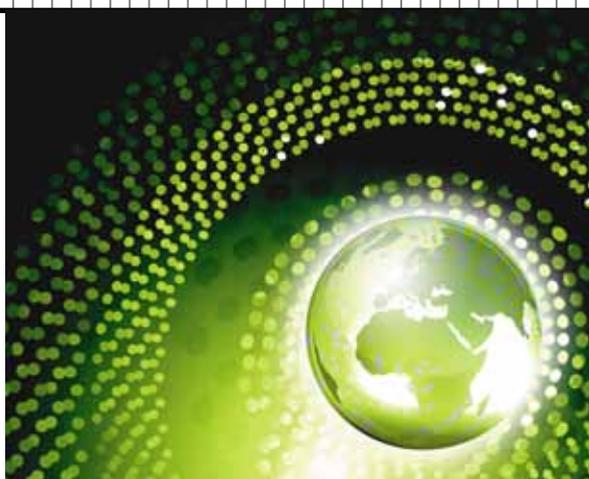


IBM's University Programs

➔ James C. Spohrer, *IBM University Programs*



As IBM looks forward to the coming decade, it pauses to reflect on its history of academic partnerships.

IBM has historically been associated in student, faculty, and university administrators' minds with the core information technologies needed to run the world's most complex organizations and systems. In 1945, a few years before the transistor's invention, members of IBM's technical staff and faculty at Columbia University's Watson Scientific Computing Center were already co-teaching some of the earliest classes in what would eventually become the academic computer science discipline. An *IEEE Annals of the History of Computing* report documents these pioneering decades when mainframe computing arrived on college campuses (W. Aspray and O.B. Williams, "Arming American Scientists: NSF and the Provision of Scientific Computing Facilities for Universities, 1950–1973," *IEEE Annals of the History of Computing*, vol. 416, no. 4, 1994, pp. 60–74).

The IEEE report specifically highlights IBM's role in working with universities to co-create the workforce needed to advance the US and global economy, with innovations in core business accounting, the Fortran scientific computing language, defense systems, airline scheduling, space missions, retail and electronic data exchange networks, satellite

control systems, weather prediction, and related foundational IT applications for business and society.

Advances in disk drives, magnetic storage systems, lithography, and many other component technology areas couldn't have been sustained without strong academic partnerships.

TOMORROW'S PIONEERS, TODAY

A few decades later, higher education's perception began to evolve as IBM's partnerships with other companies brought large numbers of PCs to campus. This helped create the first generation of computer-literate business leaders in business schools. Meanwhile, IBM's researchers and production process specialists were working with physicists, chemists, and electrical engineers from university research centers in the US, Europe, and Asia to improve PC components, including disk drives and energy-efficient multicore processors.

As open innovation with universities gained momentum from Internet and Web applications, IBM's endorsement of Linux for e-business, support for Eclipse development environments, sponsorship of ACM's ICPC programming competition, and donation of IP to open standards groups

helped faculty and students transition innovative ideas into new market offerings.

More recently, the IBM-Google Cloud Computing University Initiative partnership with the National Science Foundation has provided several university partners with access to cloud computing capabilities for advanced research projects such as the Florida International University's Terraflly effort, which explores massive analytics for geospatial datasets. Likewise, IBM university program assistance to North Carolina State University as it developed the Virtual Computing Lab (VCL) software, donated to the Apache Foundation, has made cloud computing more accessible to educational institutions. Again, higher education's perception of IBM changed, with more emphasis on open innovation among large corporations to accelerate co-creation and adoption of new technologies (H. Chesbrough, *Open Business Models: How to Thrive in the New Innovation Landscape*, Harvard Business Press, 2006).

Over the decades, students' perceptions of what it means to work for and with IBM have evolved around IT for the changing needs of business and society. IBM has hired many thousands of university

graduates and provided internship opportunities for science, engineering, management, and information school students around the world. Universities have provided the talent that keeps IBM innovative, enabling the nearly century-old corporation to continuously reinvent itself.

THE FIVE R'S

University partnerships continue to expand steadily. For example, IBM is working with a consortium of universities on the Watson deep-question-answering supercomputer project to create the next generation of natural language human interface capability, which is set to revolutionize the speed of access to Web- and enterprise-scale information sources (<http://www.ibm.com/press/us/en/pressrelease/27324.wss>).

Another university consortium is partnering with IBM on the Cognitive Computing project, which aims to understand the brain's architecture and provide the foundation for even more powerful, low-energy supercomputing in the future (<http://www.ibm.com/press/us/en/pressrelease/28842.wss>).

In partnership with Texas's Rice University, among others, IBM is working to apply the latest advances in processor technology to the challenge of biomedical supercomputing, including cancer research.

Significantly, these and other grand challenge projects represent public and private partnerships that interconnect university, industry, and government groups co-investing in creating capabilities that can dramatically improve the productivity of future knowledge workers. These trends are indicative of the central and growing role that academic partnerships play in stimulating and sustaining regional and global economic development (see E.P. Trani and R.D. Holsworth, *The Indispensable University: Higher Education, Economic Development and the Knowl-*

edge Economy, Rowman & Littlefield Education, 2010).

Today, we measure the vitality of university programs for IBM and many other industry partners in terms of "the five pillars" or "five Rs": research, readiness through skills, recruiting, revenue, and responsibilities.

Research

At IBM, four award programs focus on Shared University Research (SUR), Open Collaborative Research (OCR), Faculty Awards, and PhD Student Fellowships (<http://download.boulder.ibm.com/ibmdl/pub/software/dw/>

Grand challenge projects ... interconnect university, industry, and government groups.

[university/awards/IBM_awards.pdf](http://download.boulder.ibm.com/ibmdl/pub/software/dw/university/awards/IBM_awards.pdf)). These highly competitive programs establish relationships between IBM's research, business divisions, and universities.

Hundreds of award winners benefit from these programs annually. In addition, the IBM Centers for Advanced Studies exist in partnership with more than 40 universities worldwide, supporting a growing number of IBM Research *collaboratories* in major cities. They focus on new knowledge creation to improve IT and its applications while developing researchers' capabilities to address the grand challenge problems of business and society.

Readiness

The Academic Initiative program lets registered faculty access IBM tools, systems, and other content for teaching and education at universities. Students can gain experience and certifications important to their transition into the workplace. For

example, INNOV8 is an educational simulation in which students learn to balance quality and productivity as part of a business-process management task for call centers.

The IBM Cloud Academy and IBM Academic Cloud provide new initiatives aimed at making access to a broad range of tools easier. In addition, the IBM Innovation Centers and University Ambassadors provide regional enablement for universities and other IBM business partners on IBM tools and systems. Hundreds of thousands of students benefit from these programs annually. Rethinking skills depends on maintaining an on-going dialogue between industry, academia, and professional associations (http://www.ieee.org/education_careers/education/tee_conference/index.html). IEEE and other professional associations play a key role in encouraging the dialogue and stimulating needed debate (<http://www.computer.org/portal/web/computer/computingpractice>).

Recruiting

Working with university placement offices, IBM human resources recruiters provide information and assistance about both full-time and internship career opportunities worldwide.

The HR goal seeks to identify and match the top students from science, engineering, mathematics, analytics, management, information, public policy, humanities, and other schools to positions in IBM, such as staffing regional development and solution architecture labs, sales and consulting centers, service delivery centers, and business analytics and optimization centers, as well as diverse industry and technology specialist positions.

Revenue

From IBM's business perspective, universities are themselves complex organizations, often with tens of

thousands of “customers” on campus, and many more accessing online content or global campus locations. IT continues evolving to better address these needs.

Across content management, asset tracking, campus data center design, operations, enterprise and architecture planning, and organizational change execution, many IBM offerings attempt to help universities more efficiently create new capabilities for their students, faculty, and administrators.

For example, as universities work to reengineer and expand capabilities, more public and private partnership opportunities present themselves, including energy-efficient buildings and data centers, university-based service delivery centers, high-performance computing research centers, regional nanotechnology centers, business analytics centers, and a host of other projects that enhance universities' prestige and create more regional, high-skill jobs.

Responsibility

IBM, like other leading global corporations, encourages its employees to give back to their local communities through charitable donations, volunteerism, and other corporate social-responsibility programs, including IBM's own Corporate Service Corps. A top corporate priority is to ensure the strength and diversity of the STEM (science-technology-engineering-mathematics) pipeline into universities, with programs reaching from primary through secondary education and into lifelong professional learning.

IBM employees give generously as alumni, and corporate matching programs increase these benefits. Thousands of them volunteer their time as guest lecturers, adjunct faculty, members of advisory boards, or University Ambassadors, sharing their knowledge and skills to enrich university courses and research projects.

Dozens of other programs, including the World Community Grid, benefit open collaborative research efforts in universities and other community organizations around the world. Further, many IBM executives participate in the Partnership Executive Program (PEP) for universities, which identifies collaboration opportunities.

Annually, these programs result in tens of millions of dollars and hundreds of thousands of hours invested in building multifaceted relationships with more than 5,000 universities and institutions of higher education around the world. Equally significant, these collaborations provide co-investment opportunities to universities and other partners that can significantly advance knowledge in emerging areas.

During Earth Day 2009, IBM invited universities from around the world to participate in IBM's Smarter Planet University Jam, an online brainstorming session. For three days, nearly 2,000 students and faculty interacted with IBM staff members, generating discussion topics and ideas about smarter healthcare, education, energy and electricity, water and the environment, and city planning. Students' readiness to engage with industry and government to begin making a difference in reducing waste, eliminating inefficiencies, and realizing the benefits of instrumented, interconnected, and intelligent systems proved to be a key finding. (http://download.boulder.ibm.com/ibmdl/pub/software/dw/university/smarterplanet/Jam_Report_2009.pdf)

In the decade ahead, IBM will seek university partners ready to build a smarter planet. T-shaped graduates with deep problem solving skills and broad communications skills will be needed (<http://beyond-it-inc.com/GKEblog/ibm-transforms-academic-initiative-to-ssme-to-smarter-planet.html>).

Working with universities, a \$4 trillion challenge has been identified, requiring a system-of-systems approach (www.ibm.com/services/us/gbs/bus/html/ibv-smarter-planet-system-of-systems.html). Universities as centers of innovation, sources of talent, and cities within cities are ideally positioned to play a significant role in addressing the \$4 trillion dollar challenge to accelerate quality-of-life improvements in major urban areas around the world. This is a function of both the quality of service from systems and the quality of opportunities for people in systems, including meaningful jobs and gainful investments.

Fundamental theoretical contributions to mathematics, physics, computer science, and the emerging transdiscipline of service science, management, and engineering (SSME) provide additional vibrant areas of interest. While the bulk of the IBM university programs' efforts focus on applied research areas, basic research remains essential for opening important new vistas. Together, we can continue to accelerate innovation that matters throughout business and society, improving the quality of life around the world. **■**

James C. Spohrer is director of IBM University Programs (IBM UP) worldwide, based at the IBM Almaden Research Center in San Jose, California. His research interests include service science applied to the study of holistic service systems, such as universities and cities. Contact him at spohrer@us.ibm.com.

Editor: Sumi Helal, Department of Computer and Information Science and Engineering, University of Florida; helal@cise.ufl.edu

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