

7—Community and Stewardship



7.0 Plans for Community Engagement and Stewardship

PNNL will play a significant role in building a vibrant economy and fostering a business climate and quality of life that will not only ensure its long-term success, but that will bring significant benefits to the community and the Northwest.

In the next five years, we will enhance our commercialization program, generating returns for the Laboratory as well as our region. Our experience in serving both private and government markets enables us to transform scientific knowledge into useful products that will benefit the economy and society. Success in technology commercialization begins with our staff, who will be engaged in strategy development and rewarded for their efforts in developing intellectual property. We also are looking for partners who can help us deploy technology—partners who understand the market needs and who might be willing to co-invest in maturation and product development. Through an effective commercialization program, we can reinvest in the Laboratory's staff and infrastructure, making it an even stronger S&T asset for the region and the nation.

Beyond the Laboratory's own commercialization program, we will be linking the substantial S&T resources of the Northwest. PNNL and its partners intend to create new products and services that will spur economic development. One program, called Linking Regional Resources, is aimed at identifying promising new technologies from a pool of intellectual property garnered from several key research organizations. Our Technology Entrepreneurship Program then takes the next steps of evaluating the commercial potential of the technologies and developing business plans and a path forward. Based on the data and outcomes produced from these first two efforts, PNNL's New Ventures Program seeks to establish successful commercialization ventures.

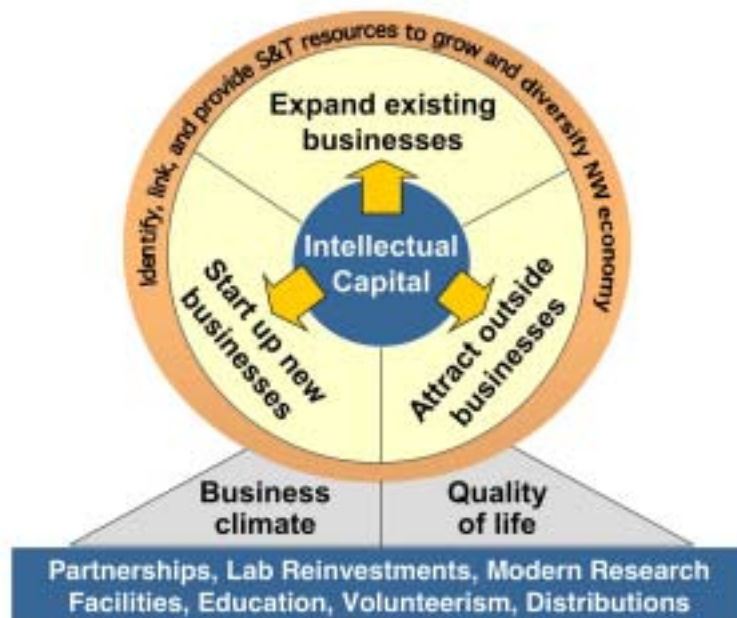
We also will be using new approaches to grow and attract technology-based business that shift the local economy from its current dependence on Hanford Site cleanup programs. By making our researchers available to regional businesses for a limited time at no charge, we can provide much-needed technical expertise in a wide range of fields. We are helping entrepreneurs connect with funding and business expertise as they make their way through the typically long gap between product invention and revenue generation. In addition to assisting existing and new businesses, we are leading an effort to attract the research operations of large corporations to locate near PNNL. And because of our connections to technology business advocacy organizations, we can provide information critical to technology-based entrepreneurship.

We recognize that our role in strengthening the local and regional economy is only one part of the definition of good community stewardship. We are looking beyond the R&D needs of the region to needs of the future workforce—the young women and men who bring us the next-generation breakthrough S&T. Through a wide range of workforce programs for students and teachers, we will

help ensure that there is a sufficient pipeline of qualified scientists and engineers. For example, we plan within the next two years to be fully participating in the Laboratory Science Teacher Professional Development program, a new DOE initiative designed to support teacher quality. We will continue to be a key partner in improving science education through the Washington State Leadership and Assistance for Science Education Reform project.

Underlying our success at increasing PNNL's impact on regional economic development and quality of life is our ability to continue working at the frontiers of science and technical innovation. During the course of the next five years, we plan major acquisitions and modifications to our research campus so we can effectively address DOE's most significant challenges and contribute to the vitality and prosperity of the community and region. Our plans for modernizing our research campus call for relocating out of the 300 Area to support Hanford Site cleanup; replacing aged, Cold War 300 Area facilities that house core research capabilities; establishing key partnerships that expand our capabilities through shared staff, equipment, and facilities; and acquiring new user facilities that strengthen the regional S&T base.

PNNL has long been known for being a good community steward and a partner in local economic development, but we recognize that it is time to expand the Laboratory's S&T resources to make a more significant contribution to the region. Through the efforts outlined above, we envision that PNNL will set the standard among DOE national laboratories for creating and deploying technologies that advance economic prosperity and community vitality.



PNNL's Model for Community Engagement and Stewardship shows how enhanced efforts ranging from technology commercialization to science and engineering education, coupled with strong volunteer programs and generous corporate donations, will strengthen PNNL's presence and impact both locally and regionally.

7.1 Reinvesting in the Laboratory Through Technology Commercialization

Through a strategic Technology Commercialization program, PNNL will provide high value to our partners, society, and the economy, and generate returns that will be reinvested in the Laboratory's staff and infrastructure.

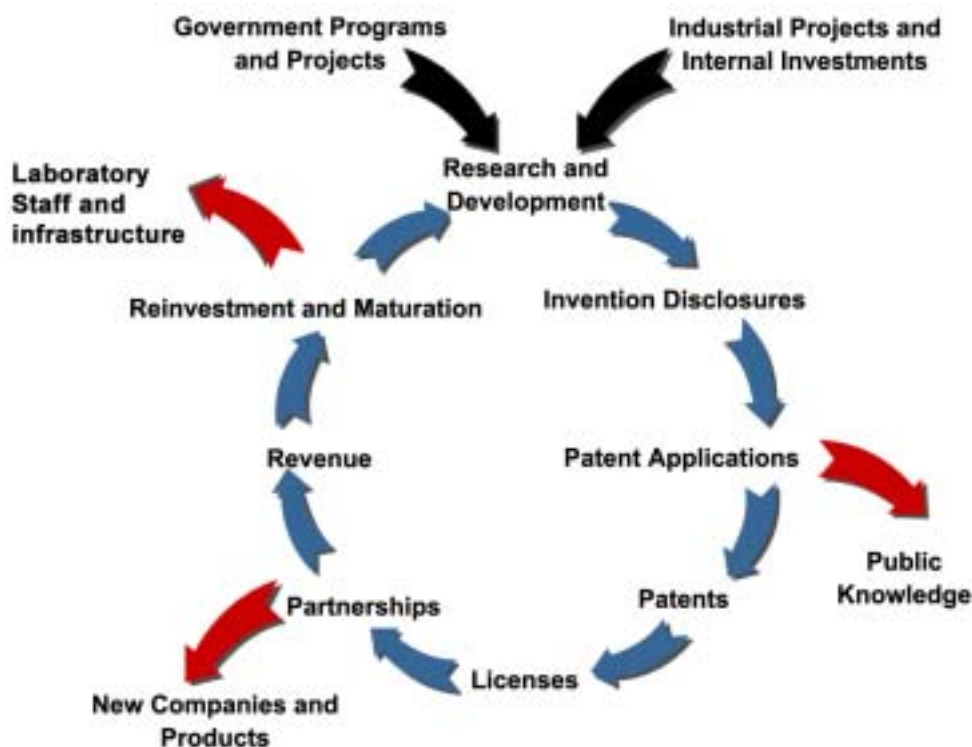
Battelle brings a long history of commercial experience combined with distinguished performance in the management of PNNL. Our experience with private industry and private capital markets and partners, as well as the government, allows the dual objective of advancing scientific knowledge and converting that knowledge to useful products in areas of commercial market interest. Through successful commercialization and technology deployment, revenues are reinvested in staff and infrastructure, enhancing and strengthening the R&D capabilities of the Laboratory.

Our Technology Commercialization program will strategically capture, evaluate, protect, mature, license, and manage PNNL-developed intellectual property to assist in growing DOE, other government, and commercial business at PNNL. Intellectual property experts focus on early and frequent engagement with technical staff, knowledge of current programs and projects, and shaping R&D toward high-value outcomes. We combine invention evaluation and positioning with early business information and market characterization to assess the benefits of protecting or maturing intellectual property derived from R&D programs. Using a combination of patenting and business management skills, we will provide efficient patenting decisions and results. Technical staff will be engaged in the strategy development and commercialization process and be rewarded for their intellectual property development and commercialization results. A broad array of appropriate government and private resource investments are applied in promising technologies to maximize the value for deployment.

Deployment options are broadly evaluated to include balancing commercial opportunities with contract R&D at all stages. We will identify key strategic partners for licensing and business development for future growth and revenue generation. Priority consideration is given to investments where knowledgeable partners understand the market needs and ultimate product success criteria, and are willing to co-invest in maturation and product development. We will deploy Laboratory technology and intellectual property through a variety of technology transfer mechanisms appropriate for both the partner and the Laboratory. Experienced licensing professionals are assigned technology portfolios that are actively marketed. We use best practices in a variety of ways to offer the best tools available to conclude successful licenses.



Commercial success will provide recognized infusion of DOE S&T into the public economy, demonstrating to Congress and the public that DOE's programs are a good investment of taxpayer dollars. Reinvestment of commercial returns will provide resources for science, technology, and capability development to meet future DOE and national needs. We will continue to apply our revenues from privately and DOE-funded technology transfer activities to fund new capabilities, new equipment, and R&D in DOE and Battelle-owned facilities at the Laboratory to seed next-generation technologies. Investments by Battelle in technology maturation, product development, patenting, and licensing activities at PNNL will significantly enhance the value of DOE-derived technologies. The ultimate payoff is in creating and deploying technologies that advance science, create new knowledge, and benefit the economy and society.



Value Creation Wheel – PNNL's Technology Commercialization program fosters strategic technology deployment through commercial licensing or other technology transfer mechanisms. Benefits such as increased public knowledge, new companies and products, and reinvestment revenues are realized.

7.2 Major Economic and Educational Benefits to the Community and Region

PNNL will contribute to an economically vibrant and diverse community and region through its S&T resources, robust workforce development pipeline, and Northwest partnerships.

Linking Regional Science and Technology Resources

We will achieve Northwest social and economic development objectives by linking the S&T resources of the region's major institutions. The region's public research institutions collectively conduct over \$2 billion in R&D, which in turn produces valuable intellectual property and technical capabilities that can be used to solve social and industrial problems in the Northwest. In collaboration with government and trade organizations, we have formed the Linking Regional Resources group, which identifies areas where technologies can address issues of concern to the Northwest. Further, by working with the university technology entrepreneurship programs, investors, and entrepreneurs, PNNL—along with its partner institutions—can form viable business solutions that not only help to strengthen the economy, but also address the technology-based needs of the state's and regional industry. See Module 7.2.1 for discussion of specific planned activities.

Local and Regional Growth and Diversification

We will grow and diversify the local economy by using our technology resources and network relationships. The overall objective is that the local and regional technology-based economy will be significantly more diverse, with PNNL having served a meaningful role in creating that shift. We will devise new economic development approaches, while also using proven approaches, to help grow the technology sector. We will make our researchers available to regional businesses for limited engagements at no charge while striving to achieve a high level of client satisfaction, as measured by surveys. Using our connections throughout the Northwest, we will play an important role in helping local and regional firms obtain the necessary investment and grant funding for new product development and company growth. We are also undertaking an effort to attract other large technology-based organizations to the local area. Finally, we will create and provide information to help entrepreneurs access money, business opportunities, experienced management team members, and other sources of expertise. See Module 7.2.2 for discussion of specific planned activities.

Science and Engineering Education

We will enhance the S&T pipeline and support economic development by improving regional science and engineering education. Our programs integrate research and education and will link the Laboratory's human, financial, and technical resources with elementary and secondary schools, colleges and universities, and other education-oriented organizations to improve learning and teaching. Activities will include 1) promoting and facilitating research and education partnerships with postsecondary institutions, 2) enhancing S&T literacy of students and teachers, 3) contributing to the education of future scientists and engineers, 4) promoting diversity in the science and engineering "pipeline," 5) connecting academic learning to the world beyond the classroom, and 6) providing an education forum for discussing science issues. See Module 7.2.3 for discussion of specific planned activities.



PNNL will contribute to a technology-based regional and local economy by providing S&T resources, a robust workforce development pipeline, and partner relationships.

7.2.1 Building Substantive Partnerships and Regional Advocacy for PNNL and DOE Missions

Through three key programs—Linking Regional Resources, Technology Entrepreneurship, and New Ventures—PNNL connects its S&T resources with those of the region’s major research and business institutions, thereby achieving its Northwest social and economic development objectives.

Linking Regional Resources

PNNL, through its Linking Regional Resources (LRR) program, partners with major research institutions in Washington, Oregon, and Idaho to identify, link, and provide technology solutions that address regional social and economic development objectives. This program, established in 2001, collects, analyzes, and bundles the Northwest region’s intellectual assets. The goal is to use the intellectual property to create new products and services, thus stimulating regional economic development and enhancing quality of life. Potential applications of the S&T inventory created via LRR include coastal and homeland security, environmental protection and cleanup, enhanced power distribution, bioproducts and bioprocessing, and more.

In most cases, technologies are viewed as viable, but do not always have a clear path to market. Regularly, patents and related information provided by the participating research organizations are entered into a PNNL-developed information visualization software called Starlight. The software compares the entire inventory of intellectual properties, identifying and bundling together similar technologies that may be more effective, versatile, and valuable when applied collectively.

During the next five years, we will continue to regularly gather and analyze the intellectual properties provided by partners. Additionally, we will strengthen our relationships with participating regional institutes, foster innovative collaborative approaches to commercialization, and reach out to new potential members. Current members of LRR include senior representatives from the research and/or technology transfer offices of the INEEL; the Oregon University System (Oregon State University and the University of Oregon); the Inland Northwest Research Alliance (WSU, Idaho State University, and the University of Idaho); the Oregon Health & Science University; the Fred Hutchinson Cancer Research Center; and the University of Washington.

Technology Entrepreneurship

While identifying technologies to solve specific problems is important, it is not alone sufficient to move the technology forward to provide a benefit in the marketplace. PNNL’s Technology Entrepreneurship program uses the region’s matriculating entrepreneurial students to develop commercialization strategies for promising intellectual properties.

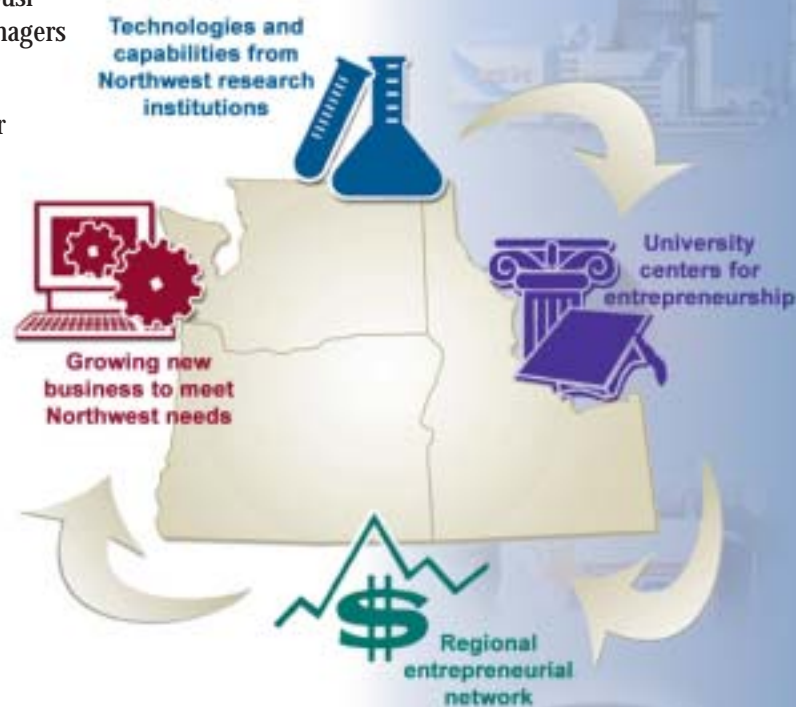
The Technology Entrepreneurship program examines technologies from PNNL and other major research institutions, evaluates the commercial potential of the technologies, and develops strategies for commercialization, including business plans that identify the pathway, steps, and resources required. Through this program, we are forging strong partnerships with colleges and universities aimed at both commercializing promising technologies and, perhaps most importantly, developing the entrepreneurs of tomorrow. We have worked successfully with the University of Washington and the University of Oregon to provide opportunities for business students to formulate business plans for promising PNNL-developed technologies. Some of the plans have received awards in national competitions. In the future, the program will build on existing partnerships and broaden the capability by cultivating new programs with other regional universities.

New Ventures

The third element in PNNL's regional approach, the New Ventures program, seeks to create significant value for the Laboratory and region by establishing or expanding new high-technology enterprises in the Northwest. New Ventures is designed to translate the data and outcomes produced by the LRR and the Technology Entrepreneurship programs into successful commercialization ventures. For technologies possessing promising commercial potential, solid market and strategic business information, and seasoned management teams, the New Ventures program moves intellectual properties from the strategy and planning stages to the marketplace via a network of Northwest business experts and organizations. The technologies will come increasingly from the bundles of intellectual property created by the LRR program, and the university entrepreneurship centers will provide the market and strategic business information. Networks of entrepreneurs and managers will provide the required management skills.

Through these various programs, we are harnessing our breakthrough S&T to achieve excellence and accomplish key DOE goals, including:

- ◆ Delivery of S&T to meet key regional and national needs.
- ◆ Promotion of regional research collaborations that maximize the value of research dollars and discoveries.
- ◆ Development of new businesses, which will lead to regional economic development and diversification, as well as enhancement of the Northwest's quality of life.
- ◆ Creation and sustenance of innovative entrepreneurs who, over the next 20 to 50 years, will find effective new approaches for moving technology from the laboratory to the marketplace, ensuring that over the long term, PNNL delivers tangible, real-world solutions to the region and nation.



PNNL works with Northwest research institutions, university centers for entrepreneurship, and regional organizations to find commercial outlets for S&T solutions to regional needs.

7.2.2 Applying PNNL's Technology Resources to Diversify and Grow the Local and Regional Economy

PNNL will apply its technology resources and connections to grow and diversify the local and regional economy, playing a meaningful role in the transition to a technology-based sector that is significantly less dependent on Hanford Site funding.

Economic Development and Diversification

We will use new economic development approaches to start, grow, and attract technology-based businesses locally. The overall objective is that the local technology-based economy will be significantly less Hanford-dependent, with PNNL having served a meaningful role in creating that shift. The Three Rivers Technology Alliance, which PNNL leads, is currently developing specific goals to assess progress toward a technology-based, Hanford-independent local economy. These goals will serve to guide our efforts to diversify and grow the local economy. We will devise new economic development approaches, some described in the following sections, while also using proven approaches, to help grow the local technology sector. The new approaches will be used to obtain funding for entrepreneurs, recruit experienced executives for entrepreneurial ventures, and develop a “critical mass” of technology-based employers in the local area.

Providing Technical Assistance to the Community

We will make our researchers available to regional businesses for limited engagements at no charge. While PNNL offers more than a dozen economic development programs, one of the most impactful is the Technology Assistance Program, in which researchers are made available in one-week increments to provide technological help to businesses upon request at no charge. We will strive to continue to deliver this program with satisfaction rates exceeding 90 percent, equaling the results achieved while providing assistance to about 600 firms during the last 8 years. While purely demand-driven, we will continue to provide technical help in areas such as new product development, materials characterization, chemical process development, peer review of new technologies, environmental management, medical devices, software design, energy conservation and production, and advanced sensors.

Finding Funding

We will help make regional business experts and funding sources available to local and regional entrepreneurs. Because there is typically such a long period between product invention to revenue generation in the technology sector, it is essential for technology businesses to obtain funding to sustain their operations until revenue generation occurs. We will play an important role in helping local and regional firms obtain the necessary investment and grant funding for new product development and company growth. For example, we will help identify equity capital sources by participating actively in two regional investor groups, the Alliance of Angels (as an honorary member) and the Delta Angel Group (as a sponsor), and in

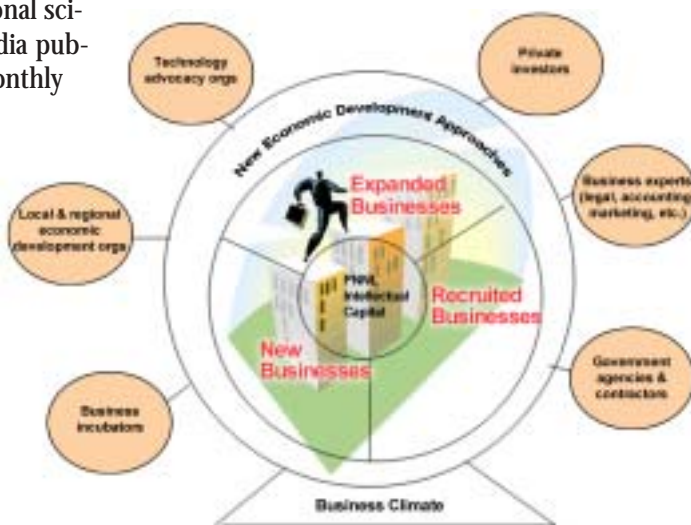
other groups, as appropriate. We will continue to host seminars and other events to teach local entrepreneurs how to seek equity and federal R&D capital. By offering the Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Alerting Service and the Northwest Technology Investor Network, we will help entrepreneurs connect with funding sources. Likewise, we will help local entrepreneurs identify executive, technical, and advisory candidates through the Technology Job Connection service.

Strength in Numbers

We will lead an effort to identify and attract R&D operations of large corporations to locate near PNNL. A big factor in developing a thriving technology sector in the Tri-Cities is the need for more than just one large R&D organization (PNNL) here. Therefore, we are undertaking an effort to attract other large technology-based organizations to the local area. The first step, currently under way, is to identify the characteristics of PNNL that make it attractive as a neighbor to other technology-based organizations. In later steps, a subcontractor will identify industries and large firms that would benefit from having a facility near PNNL, and the Tri-City Industrial Development Council will be provided with a list of specific candidates to contact. We will work with other local organizations to make its property and technological resources available to desirable neighbors of PNNL.

The Source for Technology Business Information

We will create and provide information to enhance economic development outcomes locally and regionally. Our position as a national laboratory and connections with technology business advocacy organizations regionally give us unique access to information that helps foster technology-based entrepreneurship. We will continue to host educational seminars for entrepreneurs and provide the web-based Northwest Technology Investor Network, the SBIR/STTR Alerting Service, the monthly Tri-Cities Tech Business Update newsletter, the database “Organizations that Provide Support to Small Businesses and Entrepreneurs in Benton and Franklin Counties,” the Technology Job Connection website, and invited articles for regional science, business, and media publications, including a monthly column on local economic development in the *Tri-City Herald*. These information tools will help entrepreneurs find money, business opportunities, experienced management team members, and other sources of expertise.



PNNL will use its technology assets and connections to help shift communities into a tech-based economy that is significantly less dependent on Hanford funding. (See Appendix A for descriptions of partner relationships.)

7.2.3 Workforce Development Through University Collaboration and Science and Engineering Education

Our focus on workforce development programs for students, professional development of teachers/faculty, and science education reform in schools will increase the likelihood of a diverse and sufficient supply of stellar scientists and engineers for DOE, PNNL, and the nation/region.

Major Educational Outreach Programs

To support the education, diversity, and research objectives of DOE's Office of Science (SC), PNNL, and our education partners, our wide range of programs, partnerships, and outreach efforts will span the pipeline from grade school to graduate school. We currently participate in all four SC education programs for undergraduate students, which include the Community College Institute, Pre-Service Teacher Fellowships, Science Undergraduate Laboratory Internships, and the Faculty and Student Teams program. By leveraging the funding supplied by SC, we will continue to expand the number of students impacted by these programs, with a goal of maintaining greater than 100 student participants per year in those SC programs.

Beginning in FY 2005, we will fully participate in the Laboratory Science Teacher Professional Development Program, the newest national education initiative of DOE's Office of Workforce Development for Teachers and Scientists, designed to support the "teacher quality" provisions of the U.S. government's No Child Left Behind legislation. If this program is fully implemented by DOE, we will host 75 to 100 teachers in various workshops and research experiences in FY 2005.

Using a strategic hire made in FY 2003 and the opportunity offered through the formation of the Office of Fellowship Programs, we will pursue external funding for student and professional development programs to augment our traditional base of support from DOE and PNNL. In FY 2004, we will submit a proposal to the National Science Foundation for a Research Experience for Teachers grant focused on community college faculty. Additional strategy areas designed to increase the number of students and teachers impacted by our outreach, reform efforts, and research programs, are described below.

Strategies for Increased Impact

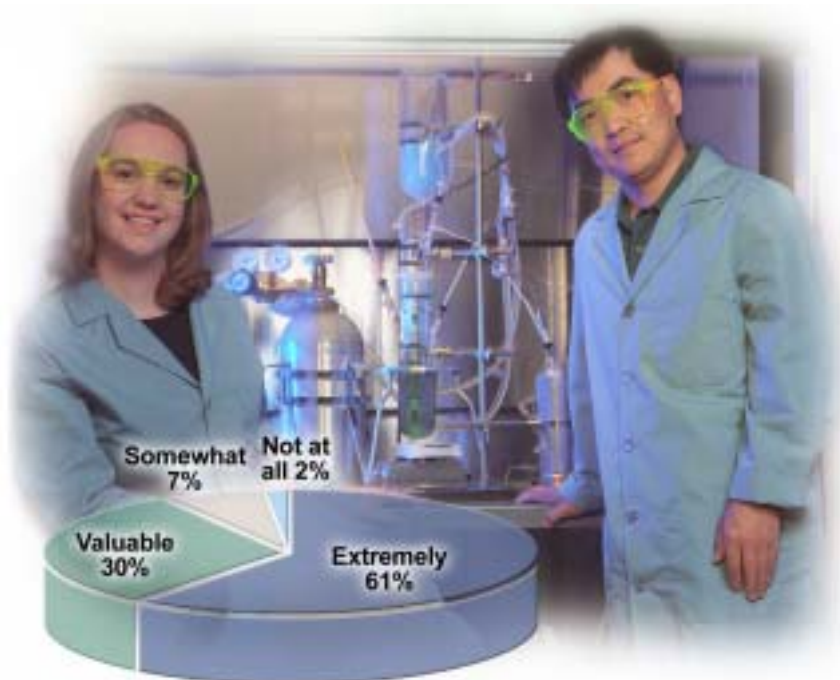
We will be recognized nationally and regionally as playing a key leadership role in efforts to catalyze widespread improvements in science education, through the Washington State Leadership and Assistance for Science Education Reform Project. This program will expand to involve approximately 120 school districts and 440,000 students and teachers by 2005. Funding from the state and external sources will reach more than \$5 million by 2005.

Our strategies will allow PNNL to fully participate in DOE's national effort to encourage students from underrepresented groups to pursue scientific and technical careers. Historically, drawing underrepresented students from outside the region to the Pacific Northwest has proven very difficult. We will design and

complete a survey of our diverse student appointees to learn what their key decision-making points were in selecting our site. This survey will be implemented in FY 2004 and will guide new recruitment efforts. At the same time, we will enhance this initiative by focusing our efforts on successfully transitioning participants in our local precollege diversity programs into our postsecondary programs.

We will continue to provide internships for undergraduates, graduates, and post-graduates that create a pool of applicants for regular staff employment at PNNL. Laboratory-sponsored programs include teacher development programs, high school internships, undergraduate and graduate fellowships, and limited-term employment for postgraduates. To assess the efficacy of our education programs in leading to a valuable pool of applicants for regular staff positions, we will work with Human Resources to add a survey to the sign-on or orientation process that will track how many of our new hires had national laboratory education appointments, and what the value was. This will be implemented by FY 2005. The results will allow us to determine which kinds of experiences students find most valuable in the longer term.

Finally, we will continue to provide key education functions/services and processes that support a wide variety of university/Laboratory collaborations. Our University Relations program will house Master Agreements with those institutions we work with most often, while other focused agreements will be housed in individual groups or directorates. Each year, our University Relations program will assess all the Master Agreements to ensure that they continue to support the strategic needs of the Laboratory. Examples of our research and education collaborations are in the programmatic descriptions contained in this plan, and are described fully in Appendix A.



Of the research staff at PNNL, approximately 20 percent report having had an educational appointment at a national laboratory prior to becoming staff here. Of those, the vast majority indicated the experience was very important to their career decision.

Working with her mentor, Liyu Li, Creighton University student Kayli Hall examines the catalyst process that produces hydrogen from water using visible light. The Office of Basic Energy Sciences (BES) co-funds Kayli's summer internship.

"My summer research has taught me that persistence, perseverance, and a questioning mind are the keys to being a good scientist. I hope to put the skills and knowledge that I have gained into use throughout my career."

- Kayli Hall, intern

7.3 PNNL's Facility Strategy Delivers Enabling Infrastructure

PNNL has a facility strategy and the demonstrated ability to implement that strategy, which will provide world-class scientific user facilities for the nation's science enterprise, core research facilities to support DOE programs, and partnership facilities that expand the regional science and technology base.

Strategy Overview

To accommodate our envisioned support to DOE programs, we have updated our strategy to aggressively reshape the PNNL campus with new user facilities, multiclient-funded core research facilities, and alternative-funded partner facilities. This strategy will allow rapid progress toward creating PNNL's research campus of the future while reducing the Laboratory's overall facility footprint and supporting the cost-effective cleanup of the 300 Area. To accomplish this, we will build upon our historical success in using innovative funding mechanisms and partnerships to acquire facility capacity. Module 7.3.1 provides details on our "Consolidated Laboratory" approach. In addition, we will focus on new scientific facilities where we can provide unique value. In summary, our facility strategy has three parts: maintain, divest, and move to new federally and alternatively funded buildings.

With our existing user facilities, we offer scientific researchers from across the globe access to state-of-the-art research capabilities. During this planning period, we maintain the relevancy of our existing user facility, and complement and extend our capability by proposing two new user facilities (see Module 2.0). Upon DOE initiating the facility acquisition process, we will submit a proposal to develop, deliver, and operate one of the four planned DOE Genomics:GTL facilities (see Module 2.6). Preliminary estimates place the building at 150,000 to 250,000 gross square feet (GSF), with a total estimated project cost of \$175 to \$225 million. Facility site selection is anticipated for FY 2004 along with the start of conceptual design. We are also developing a proposal for a DOE BES national complex interfacial catalysis user laboratory (see Module 3.7).

While PNNL user facilities act as an access portal to our capabilities, our core R&D facilities are the means by which our staff create and rapidly translate scientific discoveries into solutions for DOE programs. A significant portion of our core research capabilities are located in DOE-owned 300 Area buildings. Most of these facilities were built as part of the Hanford Site Cold War mission. Over the years, we have transitioned out of more than 100 obsolete facilities, but we still remain in 29 major buildings, many of which are contaminated or approaching the end of their useful life. As part of its overall responsibility for the Hanford Site, DOE is seeking to shorten the schedule and decrease the cost of the 300 Area cleanup (estimated at \$300 million for PNNL facilities alone). The PNNL facility strategy proposes to consolidate its core research capabilities housed in 300 Area buildings

into a reduced facility footprint located outside the cleanup zone. The new footprint will be next to the William R. Wiley Environmental Molecular Sciences Laboratory (EMSL) and the Battelle buildings in which DOE work is performed. This strategy proposes a mix of federally and alternatively financed buildings to balance DOE cost and risk (see Module 7.3.2 and 7.3.3).

Our Partnering Strategy

When DOE established PNNL, it expressed the expectation that PNNL use its vast scientific and engineering talent to expand the regions' S&T capability, diversify and grow the local economy, and establish close and effective relationships with universities in the region, including joint participation in research activities. One means used by PNNL to achieve these ends is by entering into formal partnerships to acquire jointly shared research capabilities. In 2002, PNNL and WSU planned a joint science and engineering facility—the Bioproducts, Sciences, and Engineering Laboratory—as part of a collective research effort in bioproducts and related sciences research. The proposed 60,000 to 70,000 GSF multipurpose facility is sited on the campus of WSU, Tri-Cities, approximately one mile south of the main campus of PNNL. Facility construction by the State of Washington is scheduled to be completed by 2006. The facility will contain classrooms, laboratories, and offices for faculty and graduate students. It will also contain research laboratories that will be leased by PNNL. This arrangement will provide PNNL an opportunity to interact directly with university faculty and students and contribute to the development of regional scientific and engineering base. See Module 3.1.3.1 for details.

Other partnership activities to be pursued during this planning period includes exploring a teaming opportunity among our Marine Sciences Laboratory and universities in Washington State. The Marine Sciences Laboratory's geographical location, technical expertise, and facilities present a clear opportunity to leverage these potential regional partners to address coastal and homeland security issues while creating educational and economical opportunities. More detail can be found in Modules 4.4 and 5.7.



The physical consolidation of PNNL's modernized research campus into a single location will enhance the Laboratory's ability to work in integrated teams.

7.3.1 PNNL's Proven Approach to Provide State-of-the-Art Facilities

Our proven Consolidated Laboratory approach creates the means to provide state-of-the-art facilities while managing cost and risk.

In 1963, the government contract to operate Hanford Site research and development laboratories established the “Consolidated Laboratory,” essentially the first use of alternative financing concepts in the DOE Complex. It allowed the combined set of government and Battelle facilities and equipment, including a single workforce and set of management systems, to be used to operate the Laboratory as a single business enterprise for both maintenance and operations (M&O) activities and Battelle private work. In the 1980s, DOE and Battelle again employed the “Consolidated Laboratory” concept to obtain third-party funding for office and computer laboratory facilities to support programmatic needs. Utilizing commercial leases, five new buildings were authorized and constructed, each within approximately 18 months (total 340,000 square feet [sq ft]).

These five buildings will be core facilities capabilities sited next to EMSL. By lengthening lease and cancellation terms, specifying the conditions under which a lease can be canceled or transferred to a successor M&O contractor, and gaining Battelle ownership of the building at the end of 25 years, a substantial cost savings can be realized (within the parameters of acceptable risk). That savings is estimated at \$1 million in the first year alone, growing substantially each year to total over \$200 million over the next 40 years. During this planning, lease restructuring will be pursued to lower costs and risk to DOE. The five buildings include:

1. Information Sciences Building 1—a 50,000-sq-ft single-story office building housing 200 staff, providing a centralized location for PNNL's Information Technology staff and the sub-network for the Atmospheric Radiation Measurement program.
2. Information Sciences Building 2—a 61,000-sq-ft single-story office and computer laboratory building with partial basement housing 250 staff and PNNL's high-speed computing infrastructure and local area network servers.
3. National Security Building—a 100,000-sq-ft two-story office building with partial basement housing 400 staff and work spaces designed for classified and sensitive data.
4. Environmental Technology Building—a 100,000-sq-ft two-story office building with partial basement housing 355 staff and computational laboratory capabilities.
5. User Housing Facility—a two-story, 82-room guest house providing onsite accommodations predominately for EMSL users.



We are proposing, under the “Consolidated Laboratory” approach, to supplement federal facilities investments during the next five years with additional partnership and leased buildings. Proposed acquisitions include the Washington State University Bioproducts, Sciences, and Engineering Laboratory, which will provide office and laboratory space in partnership with the local university; and a state or privately financed office/laboratory building, which will provide office, research laboratory, and computational space in support of federally funded laboratory buildings.



7.3.2 Timing of 300 Area Cleanup Presents Opportunity and Risk to Our Research Campus of the Future Strategy

Although the 300 Area accelerated cleanup provides opportunity for a synergistic approach that reduces cleanup costs and enables the Laboratory to cost-effectively revitalize its infrastructure, it introduces the risk of interrupted research operations if new facilities are not constructed in time for a smooth transition.

The Office of Science (SC) has recognized the need to revitalize the aging infrastructure at its national laboratories. At the same time, the DOE Office of Environmental Management (EM), which is responsible for the ultimate decontamination and decommissioning of Hanford Site facilities, is working to accelerate this activity to reduce costs. For PNNL, this creates the opportunity for a synergistic approach that reduces cleanup costs and enables us to cost effectively revitalize our infrastructure. This is an opportunity to consolidate and co-locate core Laboratory capabilities that would benefit from shared infrastructure. This provides the added advantage of bringing together disciplines in an integrated fashion, enabling new scientific discoveries, and more rapid translation of these discoveries into deployable technological solutions.

Today, 3800 PNNL staff members conduct and support research activities on a campus composed of 79 buildings with nearly 2 million square feet. Approximately one-third of that space (about 700,000 sq ft) is located in the Hanford Site 300 Area. Most of the facilities in the 300 Area were built during the 1940s and 1950s to support fuel fabrication and testing for the nation's defense production mission. Though the main 29 facilities PNNL occupies have been maintained and modernized, their basic configurations and locations reflect mission requirements of long ago. Many of the buildings, their utility distribution systems, and the ground they are sited on are contaminated. The average age of these buildings is 43 years and they have an estimated decontamination and decommissioning cost of \$300 million. Additional information on building use, condition, and deferred maintenance can be found in Appendix B.

The 300 Area facilities that we operate represent:

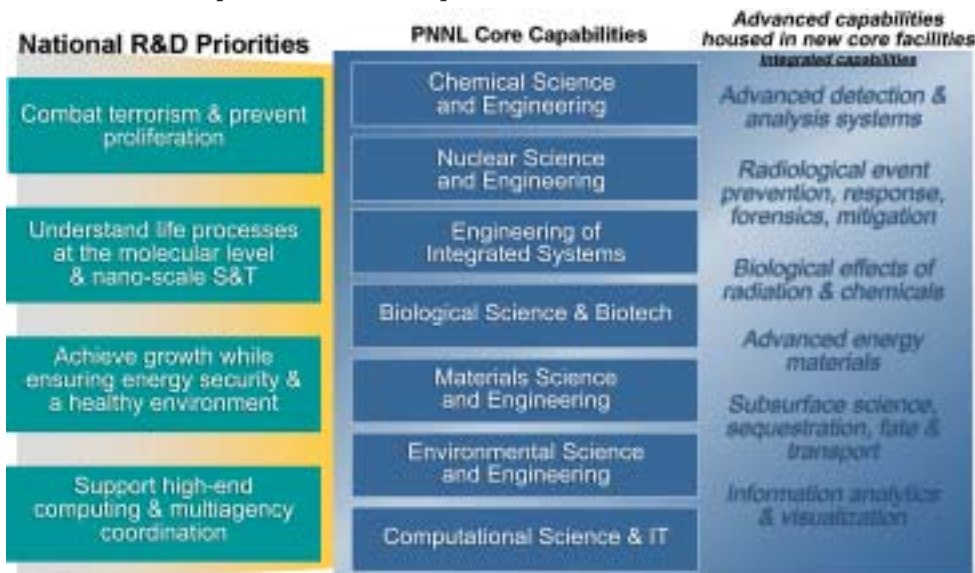
- ◆ 60 percent of our general purpose laboratories
- ◆ 32 percent of our wet chemistry laboratories
- ◆ 55 percent of our filtered ventilation laboratories
- ◆ 100 percent of our hot cells
- ◆ 33 percent of our biology laboratories
- ◆ 100 percent of our fresh-water aquatic laboratories
- ◆ office space for about 800 staff members.

We are proposing a strategy that allows us to exit 300 Area facilities in a manner that enables us to complete ongoing programmatic activities and transition critical capabilities to new buildings outside the cleanup zone. We will consolidate our core

capabilities in radiological research, as well as a significant portion of advanced analytical chemistry, physical sensing, microbial biology, materials chemistry, and dosimetry capabilities into a smaller set of facilities located closer to the core Richland campus. The uncertainty of the accelerated cleanup schedule and the unknown effect of early cleanup activities on the operations of the buildings we occupy drive us to transition out of the 300 Area as soon as possible. Authorization of FY 2006 federal funding for new research facilities (see Module 7.3.3) is essential to our strategy.

To ensure that research capabilities and ongoing programs are available to support DOE missions, we will work with the DOE Richland Operations Office^(a) and the River Corridor cleanup contractor to identify a schedule that mutually supports accelerated 300 Area cleanup and the orderly transition of core research capabilities. We are pursuing alternative financing for a portion of the replacement buildings to augment requested federal facility funding. Where possible, we are disposing of legacy waste, reducing material inventories, and readying the buildings we occupy for transfer to the River Corridor cleanup contractor. We continue to invest in our core and user facilities outside of the cleanup zone to ensure their relevancy, readiness, and reliability. Though little opportunity exists, we are also relocating small portions of our capabilities to existing Battelle private buildings and available lease property.

To maintain uninterrupted support to DOE and DHS missions, PNNL and DOE must ensure that the accelerated Hanford Site cleanup schedule is integrated with PNNL's campus modernization plan.



New core facilities will house capabilities that address critical national priorities.

(a) As part of the EM and SC organizational restructuring, a Pacific Northwest Site Office (PNSO) was established on December 5, 2003, to provide continued oversight of PNNL, which is currently being supported by EM's Richland Operations Office through FY 2004.

7.3.3 The Next Five Years

During this planning period, PNNL will take actions to ensure that it has the facility capability required to meet its customer needs and achieve the Laboratory vision.

We understand the challenges presented in maintaining and modernizing the facilities that support our capabilities and the ramifications to the nation's science programs if we are not successful. To ensure that we have the resources to add, upgrade, and maintain needed laboratories and infrastructure, the following key actions will be accomplished during the planning period:

- ◆ New user facilities/laboratories will be proposed that complement PNNL and EMSL capabilities.
- ◆ Lower long-term operating costs and risk will be achieved. One possible means is the restructure of existing commercial leases.
- ◆ In partnership with WSU, we will complete construction of the shared Bioproducts, Sciences, and Engineering Laboratory in FY 2006. The design will be initiated during FY 2004.
- ◆ We will provide mission justification for funding of FY 2006 efforts to consolidate core research capabilities located in aged Hanford Site buildings into a smaller, new complex north of PNNL's main campus. This multiclient funded space, estimated at a total of 300,000 to 350,000 square feet, is planned for FY 2009 construction completion. Approximately 70,000 square feet will be alternatively financed.
- ◆ Initially, we will propose to the Office of Science (SC), a new facility that will replace a portion of the capabilities currently located in the 300 Area. The 300 Area actions have provided an avenue to replace aged facilities with state-of-the-art facilities that will take the Laboratory into the future. This facility will allow PNNL to continue to build on its core capabilities in molecular, chemical, and environmental science. The facility will provide signature capabilities that bring new value to our current and future programs, such as systems biology and biotechnology, interfacial chemical catalysis, productive and efficient use of high-end computers, and information analytics. The proposed facility is anticipated to be approximately 90,000 to 110,000 gross square feet, and total estimated cost will be \$60 million.
- ◆ We will also propose to the Department of Homeland Security (DHS), a new facility that will replace capabilities currently located in the 300 Area. The proposed building will provide a unique array of research in support of the mission capabilities for PNNL. The facility will focus on providing multipurpose laboratories that simulate various end-user applications, supporting R&D, cross-training, and tool validation (e.g., watch and warn, regional fusion centers, emergency response). It will also provide education and training areas and an industry/university/Laboratory collaborative environment without loss of security or privacy. The proposed facility is anticipated to be approximately 80,000 to 100,000 gross square feet, and the total estimated cost will be \$55 million.

- ◆ We will accelerate the 300 Area cleanup schedule and increase costs savings by readying facilities now occupied by PNNL for transfer to River Corridor cleanup contractor. Capabilities not core to PNNL future missions will be divested. During 2003, two PNNL buildings were vacated (332 and 3718S) and readied for decontamination and decommissioning by EM. Another building (6652E) was transferred to another government agency. Two additional buildings (3720 and 306W) will be vacated in FY 2004 and readied for decontamination and decommissioning. In parallel, legacy waste from the RPL will be processed and material inventories reduced as much as possible in preparation of transfer to the Hanford Site cleanup contractor.
- ◆ We will maintain a level of maintenance and renewal investment in existing buildings that reflect building life-cycle considerations, ensure operational reliability, and enable transformational science. With the exception of EMSL, we will limit maintenance investments in Hanford Site DOE facilities to essential building systems and reconfigurations necessary to meet critical mission objections. This will result in a planned increase in deferred maintenance and deterioration in building conditions. Our FY 2005 Integrated Facility and Infrastructure crosscut budget reports an average maintenance investment without recapitalization of 1.5 percent for the planning period. Our facility strategy will in the short term drive this percentage down. Battelle will continue to adequately fund the life-cycle and modernization costs of its private buildings in which DOE work is performed. When possible, we will use IGPP funds for business or new capability development that enhance the Laboratory's research capability and investments aimed at operational savings.

Our strategy reduces our existing deferred maintenance backlog by 94 percent (\$34 million to \$2 million) and consolidates our DOE facility footprint by approximately 150,000 gross square feet, replacing 40- to 50-year-old buildings with new modern facilities. By the end of the planning period, our success in implementing the facility strategy will contribute to the resolution of the Hanford Site legacy and create DOE's enduring asset of regional S&T excellence. (see the proposed construction project table, Appendix B).

Location	Area (Sq Ft) Millions	Area (Sq Meters) Millions
DOE Main Site (300 Area)	0.906	0.084
DOE Leased	0.079	0.007
Battelle Main Site (RCHN)	0.451	0.042
Battelle Sequim	0.042	0.004
Battelle Leased	0.540	0.050
Total	2.018	0.188

PNNL partnerships with other government and private sector entities have doubled the facility square footage available to address DOE missions.

7.3.4 User Facilities Portal to PNNL

Through existing and proposed user facilities, the scientific community accesses PNNL facilities, equipment, and vibrant scientific community.

We offer scientific researchers worldwide access to state-of-the-art facilities, equipment, and research capabilities through our user facilities. For example, EMSL presents users with a comprehensive collection of unique and cutting-edge resources enabling solutions to problems in the environmental molecular sciences. Those resources are grouped into six primary facilities that focus on a broad spectrum of scientific issues. In addition, our atmospheric research Gulfstream-1 aircraft is a user facility available to both federal and private industry research. It is equipped with state-of-the-art atmospheric chemistry and physics instrumentation. Finally, we partnered with local government agencies to create Applied Process Engineering Laboratory, a user facility focused on transforming the output of fundamental science to applied solutions and economic development.

During this planning period, we are proposing two new user facilities. Upon DOE initiating a facility acquisition process, we will submit a proposal to develop, deliver, and operate one of the four planned DOE Genomics:GTL facilities. Our proposal will focus on our demonstrated capability in high-throughput mass spectrometry, imaging, systems biology, and operation of national user facilities. Module 2.6 discusses in detail PNNL's role in this program. We propose to site the new user facility close to EMSL. The size of the building is initially estimated at 125,000 to 175,000 sq ft, with a total estimated project cost of \$175 million to \$225 million. Facility site selection is anticipated for FY 2004 along with the start of conceptual design. In support, PNNL and Battelle are currently investing in critical scientific proteomic programs and capabilities; thus, two systems biology prototype facilities are being established. The first is the prototype proteomics sample processing facility located in the LSL-2 Building and EMSL, and made possible through a combination of PNNL discretionary resources and Battelle capital investments. The other is the Microbial Cell Dynamics Facility located in the DOE-owned 331 Building.

To enable the U.S. scientific community to meet the challenge of the precise control of molecular processes by using catalysts, we are in the preliminary stages of developing a proposal for a BES national user facility for complex interfacial catalysis. The Complex Interfacial Catalysis Facility will provide the tools needed to advance catalysis science by enabling the development of the fundamental principles underlying catalytic phenomena and serve as a focal point of intellectual capital in the catalysis community. Additional programmatic detail is provided in Module 3.7. This proposal is in the very early stages, but the initial estimate places the facility at around 110,000 sq ft at a cost of \$170 million.



One of the major attractions of a national user facility is its collection of state-of-the-art research capabilities housed in one location. To maintain the relevancy of our user facilities, investments in general building maintenance, building renewal, and next-generation scientific equipment capability are critical. Given the priorities for facility capital investments during this planning period, solutions for EMSL space needs will be limited to PNNL's existing footprint. The original design of EMSL allows for additional 36,000-sq-ft laboratory and 18,000-sq-ft office pods on the north end of the building. The possibility of a 27,000-sq-ft office/computer laboratory expansion located on the south end of the building that could add seminar and workshop capability has been examined. We anticipate that programmatic growth and user requirements will drive the need for these additions in the out-years.

