
HOUSTON ADVANCED RESEARCH CENTER

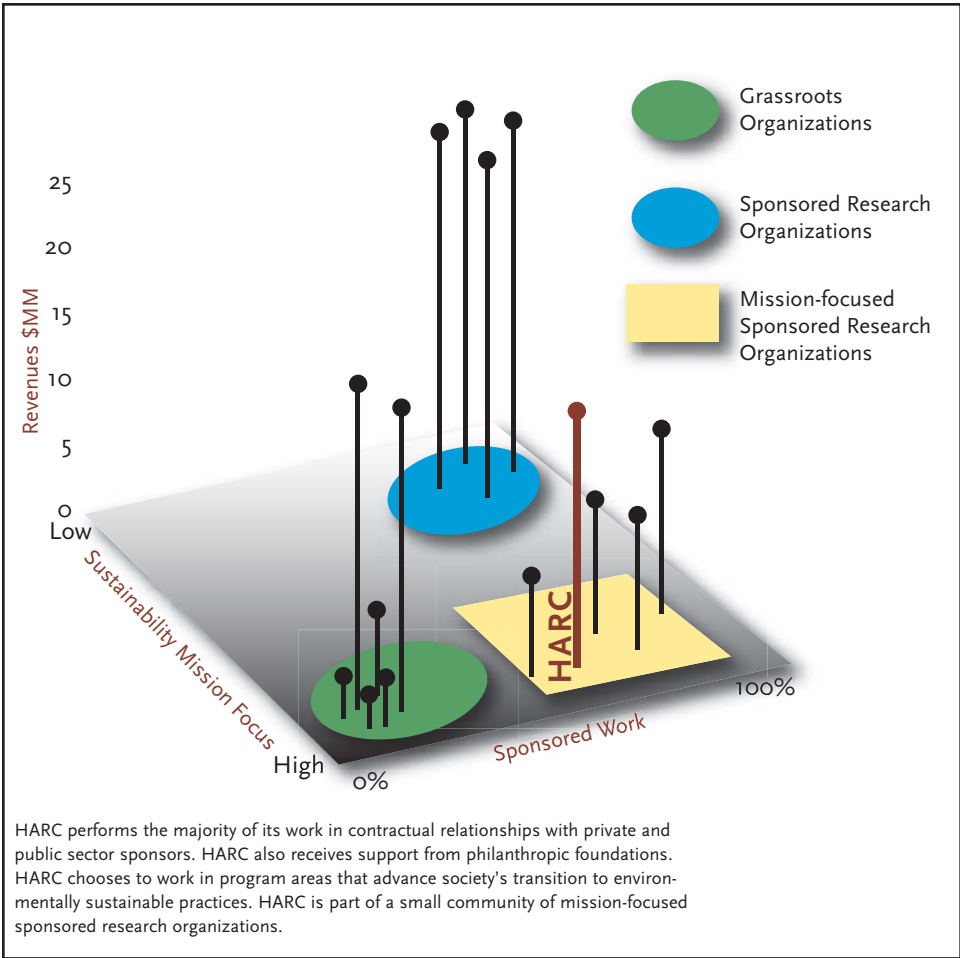


Moves
knowledge
to action
to improve
human well-being
and the environment

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Houston Advanced Research Center
4800 Research Forest Drive
The Woodlands, Texas 77381

www.harc.edu

HARC



HARC IN BRIEF

The Houston Advanced Research Center (HARC) is a nonprofit organization dedicated to creating the scientific underpinnings of sustainable development at the regional scale. HARC was created in 1982 by businessman George P. Mitchell, with the support of four Texas universities who saw HARC as a vehicle for collaboration to promote innovation, tech transfer, and basic research to strengthen the technological base of the Texas economy. After its formation HARC merged with the Center for Global Studies, a research institute dedicated to exploring sustainable development on a regional and international scale. Throughout its history HARC has maintained these two threads — a strong engineering culture dedicated to technological innovation, and a research agenda to explore the transition to a sustainable society.

In 2000, HARC narrowed its focus to work exclusively on technology and policy to support sustainable development, and adopted a geographical focus that encompasses the Greater Houston Area, and the Upper Texas Coast. HARC's research programs support sustainability solutions in ecosystems, water, air & climate, clean energy, the built environment, and environmental health.

HARC employs a staff of about 45 professionals. Revenues are projected to reach \$20 million by 2008, primarily derived from contractual arrangements with public and private sector sponsors. HARC also receives generous support from philanthropic foundations. In 2005 George P. Mitchell established the Endowment for Regional Sustainability Science, an endowment whose annual distributions are dedicated to providing HARC the institutional stability to pursue its regional sustainability mission.



Ecosystems



Water



Air & Climate



Clean Energy



Built Environment



Environmental Health

Region



HARC's Region: Greater Houston and the Upper Texas Coast

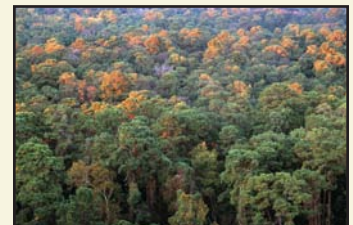
REGION: GREATER HOUSTON AND THE UPPER TEXAS COAST

Sustainability solutions must address specific local and regional needs. HARC's geographic focus is the greater Houston metropolitan area, and the Upper Texas Coast.

The **Greater Houston Area** topped 5 million people in mid-2003 and will grow in population to over 8 million by 2030. Providing housing, jobs, transportation, health and educational services for this population while protecting environmental quality will be a monumental challenge.

The **Upper Texas Gulf Coast** supports onshore and offshore industries, fishing, and tourism. Its rich coastal ecosystems are situated along North America's most important migratory flyway. Land subsidence, ecosystem fragmentation, sea level rise, invasion of exotic species, and decreasing fresh water flows into bays and estuaries are among the challenges that will increase in magnitude as coastal communities grow.

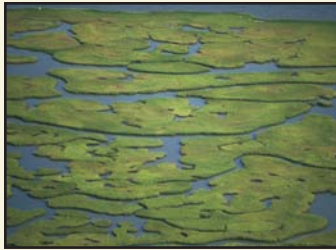
HARC focuses its attention on this diverse region and its environmental, social and economic challenges. HARC is able to translate lessons learned here to different scales and to different regions, both nationally and internationally, as well as introducing best practices from around the world to Texas.



Programs

Galveston Bay Status & Trends

HARC works for the Galveston Bay Estuary Program to monitor long-term trends in Galveston Bay water quality.



National Biological Information Infrastructure

HARC is a regional node of the US Geological Survey's NBII program and acquires, analyzes, and provides Web-based access to biodiversity data and environmental resource information.

Invasive Species

HARC partners with the Lady Bird Johnson Wildflower Center and the Texas Forest Service to track and manage invasive species using GPS and GIS technology.

PROGRAMS: HARC'S PROGRAM AREAS

ECOSYSTEMS

HARC compiles and manages numerous databases describing environmental quality, biological resources, and habitats in its region. Information technology tools and geographic information systems allow HARC to translate the data into information through the development of environmental indicators and to monitor changes in biological resources and the communities that depend on them. HARC's ability to integrate ecological and social science methods provides a realistic starting point to investigate the relationship between human activity and the surrounding ecosystems and to design sustainable management alternatives for the region.

HARC's Ecosystems Program emphasizes three approaches: assessment of biodiversity, ecological informatics, and natural resource management. The uniqueness of HARC's Ecosystems Program lies in its interdisciplinary and integrative approach, its focus on balancing human and ecosystem needs, and its ability to compile and analyze diverse information on behalf of its stakeholders.

WATER

Texas' rapid population growth is increasing pressure on the state's water resources, resulting in regional water scarcity, inadequate sewage treatment capacity, increasing non-point source pollution, falling water tables, and insufficient in-stream flows to sustain healthy aquatic and riparian ecosystems. Meanwhile, water in both rural and urban areas is used inefficiently and wasted through losses in the storage and delivery infrastructure. Improved water management requires good engineering as well as science-based analysis, effective institutions and co-operation among stakeholders. These elements come together in sustainable water management.

For more than a decade, HARC has worked on water management issues within the context of sustainable development, focusing on water scarcity on the Texas-Mexico Border Region and freshwater inflows in Texas' coastal bays and estuaries. HARC's Water Resources & Policy Program incorporates the areas of water quality, water quantity, environmental flows, water markets and technology assessment. The goal of the Program is to link water to sustainable development through improved understanding of the impacts of human actions on water resources and use this new knowledge to facilitate regulatory, institutional, legal and technological change and improved decision making.

Valuing Nature in Texas

HARC is using innovative approaches to place an economic value on the water that sustains coastal ecosystems.



Paso del Norte Task Force

HARC is funded by a major national foundation to support water conservation and planning in the Texas-Mexico desert border region.

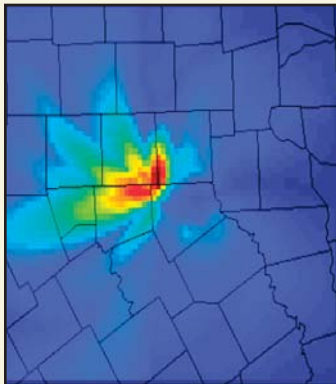
Cultivate Green

HARC's Cultivate Green program was seed-funded by the State Energy Conservation Office to create demand-side knowledge of green building practices, including water conservation and harvesting in the built environment.

Programs

Air Quality Research & Emissions Reduction Technology

HARC works on behalf of the Texas Commission on Environmental Quality and the Texas Environmental Research Consortium to manage air quality research for Houston and Dallas. For the same clients, HARC serves as a research management organization in the New Technology Research & Development program, helping emerging air emissions reduction technologies enter the Texas market.



Toxicity of Diesel Particulates

HARC is funded by the National Science Foundation to apply genomics to investigate the toxicity of nano-scale diesel emission particles.

AIR & CLIMATE

Greater Houston is designated as a non-attainment area under the federal Clean Air Act. A complex interaction of regional factors — petrochemical production and petroleum refining, urban sprawl that increases automobile miles traveled, and meteorological conditions — contributes to one of the most intractable air quality problems in the country.

Inextricably tied to air emissions is the mounting evidence linking human activity to global climate change. As an international energy capital, Houston finds itself as a central actor in the dialog on greenhouse gas emissions and climate change.

HARC's Air Quality & Climate Program includes efforts in several areas: air quality research and management; air emissions technologies; urban heat island mitigation planning; scenario building for transportation and air quality; the links between air quality and human health; air quality and the built environment; and regional impacts and solutions related to climate change.

HARC is helping Texas improve the science behind its air quality policy-making through its role as Research Management Organization to the Texas Environmental Research Consortium. This initiative has become a nationally recognized process by which key economic, environmental, and political stakeholders in the greater Houston and Dallas regions work with the research community to better understand regional air science, speed the adoption of air emissions control technologies, and make informed policy decisions.

CLEAN ENERGY

Clean, secure, and affordable energy services are critical to social and environmental well-being within HARC's operating region. Current trends suggest a serious challenge ahead. Under the business-as-usual case Texas energy demand will grow by one-third by 2025 and double by mid-century. Absent significant increases in energy efficiency, the conventional solutions to meeting this demand imply unacceptable economic, environmental and social costs. Clean and renewable energy will play a role in meeting energy demand in HARC's region and in Texas.

As clean energy technologies on both the demand and supply side move through technology readiness levels toward successful commercialization, HARC's engagement with industry, government, academia and civil society helps to implement promising technologies more rapidly and improve energy decision-making. HARC's Clean Energy Program includes integrative and collaborative work in these areas: stationary fuel cells; combined heat and power generation; energy market tools and products; strategic energy planning; clean energy applications analysis; and clean energy policy analysis. HARC will focus on new sources of energy including hydrogen and biomass and the technological, regulatory, market and social barriers to their adoption.

The mission of the Clean Energy Program is to accelerate development and adoption of clean energy technologies, services, and policies that enhance regional sustainability. HARC bridges gaps between basic research in energy services and technologies and their commercial implementation by taking the lead in convening stakeholders and in crafting and executing research, verification, and validation.

Fuel Cell Test & Evaluation

HARC works with an industry consortium to test and evaluate hydrogen fuel cells.



CHP

HARC works with the Department of Energy as a Regional Applications Center to promote the adoption of combined heat and power technologies.

Southwest Biofuel Initiative

The SWBI is supported by government, industry, university, and research organizations to promote environmentally-friendly fuels. The initiative furthers the development of new feedstocks, accelerates commercialization of biobased fuels, and documents air emissions reductions.

Programs

Hot & Humid

HARC's built environment team works on behalf of the Department of Energy and the State Energy Conservation Office to promote the use of green buildings in hot and humid climates.



Cultivate Green

HARC's Cultivate Green program was seed funded by the Texas State Energy Conservation Office to create demand-side knowledge of green building and energy efficient practices.



HARCwood™

HARC has patented and licensed the HARCwood™ process, which uses low-value cellulosic feedstock to create high-value building materials.

BUILT ENVIRONMENT

Houston's population growth will drive the construction of 36,000 new homes per year for the next ten years. These buildings, and the vast stock of existing built infrastructure, have a major impact on the quality of the environment within HARC's operating region. Poorly planned built infrastructure drives urban sprawl, ecological habitat fragmentation, water and energy over-consumption, urban heat island effects and transportation gridlock.

HARC's award winning Built Environment Program is designed as an interdisciplinary program that conducts and applies research in three major areas — building materials, building methods, and building systems that support the construction of high performance green buildings. The Program's mission is to transform the built environment in the region by advancing the creation of buildings that utilize environmentally friendly materials, conserve water and energy, and provide a healthy interior environment. HARC works with clients to pursue innovative materials and methods, energy efficiency strategies, and water conservation technologies. The Built Environment Program seeks to educate decision makers in the community and provide information to support increased use of green building technologies, design concepts, operations, and materials.

The Program emphasizes technological innovation and new collaborative ventures with manufacturers, installers, builders and users, with a focus on the challenges posed by the hot and humid climate of Southeast Texas. HARC's expertise includes site planning; architectural design; materials assessment, selection and procurement; clean energy technologies; and energy simulation and modeling.

ENVIRONMENTAL HEALTH

Advances in genetics and proteomics have created revolutionary change in life sciences R&D. The sequencing of the human genome and the explosion of the “omics” technologies — genomics, proteomics, metabolomics — presage dramatic innovations in disease prediction and prevention.

The same methodologies will also revolutionize how our society determines the safety of the compounds that are released into the environment, and how we track the unintended consequences of toxic exposure at all levels of the ecosystem. The new “omics” technologies create opportunities to gain insights into potential toxicological consequences, and to design chemical compounds and industrial materials that minimize harmful effects.

HARC’s Environmental Health Program operates at two scales. In ecotoxicogenomics, HARC applies a systems biology framework and new approaches in genetics, proteomics and toxicogenomics to investigate toxicology at all levels of the ecosystem.

At a regional scale, HARC combines information technology and expert input to develop environmental health indicators that steer the development of public policy.

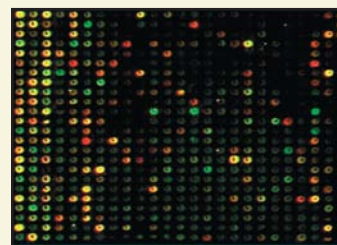
Environmental Health Indicators

HARC works with the City of Houston Health Department to develop regional environmental health indicators.



Ecotoxicogenomics

HARC integrates “omics” methodologies and a systems biology approach to speed the identification of compounds that are toxic at all levels of the ecosystem.

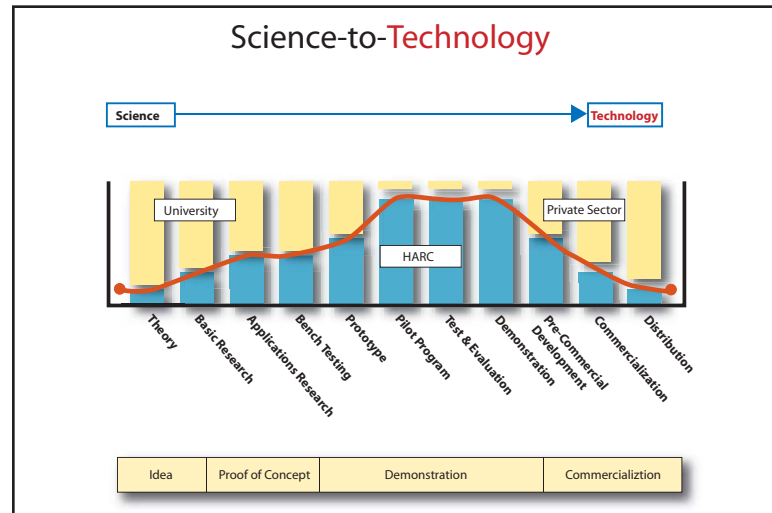


“Venture capitalists and potential customers wait until a technology has proven itself in the demonstration — usually after the product has become established in the marketplace — before making an investment or purchase. If a technology developer is unable to survive the demonstration phase, all of the funding up to this point is wasted.”

“Bridging the Valley of Death: Financing Technology for a Sustainable Future”, a report prepared by the U.S. Small Business Administration for the U.S. Environmental Protection Agency (Interagency Agreement #DW73936877-01), December, 1994

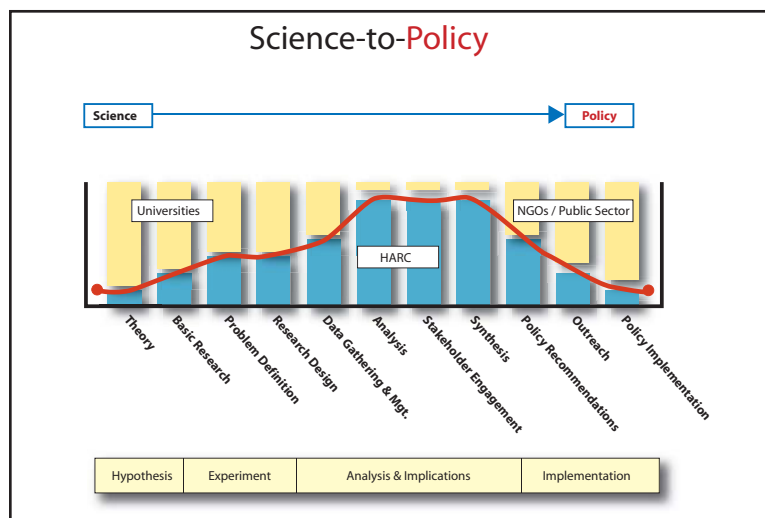
OPERATING NICHE: MOVING KNOWLEDGE TO ACTION

The role of the boundary organization is to facilitate movement of knowledge across the divide between **producers** of knowledge (in research and science communities) to **users** of knowledge (in policy-making and technology adopting communities). HARC has carefully defined an operating niche and shaped its organizational capabilities to excel in this bridging role.



In the **science to technology** process HARC seeks to facilitate society's adoption of cost effective technologies that perform essential functions while minimizing environmental impacts. HARC is active in energy, building, water, air emissions, and life science technologies. HARC focuses on the bridging activities between basic research and invention on one side — the natural domain of academic institutions — and commercialization on the other side — the natural domain of the private sector. Between research and commercialization lie a series of critical tasks.

HARC supports technologies at the stages where well-conceived concepts often fail due to lack of resources for essential testing, evaluation, prototype development, and demonstration activities. The information gathered in this stage is essential to the real-world validation, redesign, and scaling required before final commercialization. HARC works with academic, government and private sector partners to support these activities.



Public policy development requires a similar bridge. In the **science to policy** process HARC provides essential information, data analysis, synthesis, and policy recommendations both directly to policy makers and indirectly to groups with expertise in policy advocacy and public education. HARC’s organizational strengths lie in the space between disciplinary research and policy implementation. HARC understands that bridging the gap requires a non-partisan stance, the ability to adopt effective methods for managing stakeholder groups, and skill in communicating complex scientific relationships.

“The boundary organization gives both the policy-makers and the scientists an opportunity to construct the boundary between their enterprises in a way favorable to their own perspectives.”

David H. Guston, “Stabilizing the Boundary between US Politics and Science: The Role of the Office of Technology Transfer as a Boundary Organization”, in *Social Studies of Science* 29/1 (February 1999) 87–111

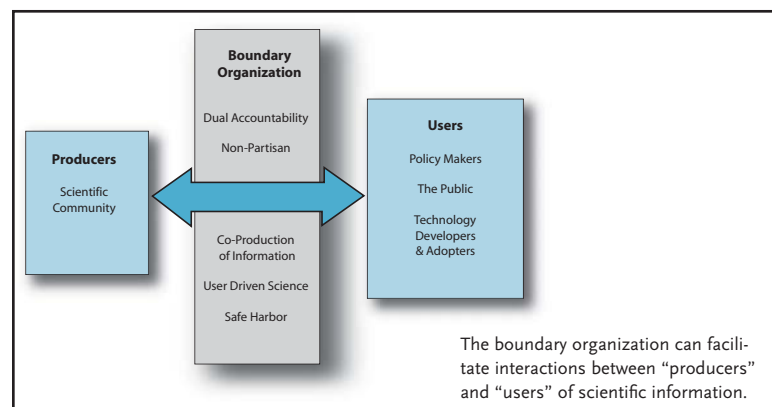
Positioning

“Efforts to mobilize science & technology for sustainability are more likely to be effective when they manage boundaries between knowledge and action in ways that simultaneously enhance the salience, credibility, and legitimacy of the information they produce. Effective systems apply a variety of institutional mechanisms that facilitate communication, translation and mediation across boundaries.”

Cash et al., “Knowledge Systems for Sustainable Development” in Proceedings of the National Academy of Sciences, July 8, 2003, vol. 100, no. 14, 8086-8091

POSITIONING: A BOUNDARY ORGANIZATION

Sustainability builds on knowledge from biological, social, engineering, and geophysical disciplines. Unfortunately, many policy and technology options never see the light of day for lack of a champion to validate, demonstrate and communicate their merits.

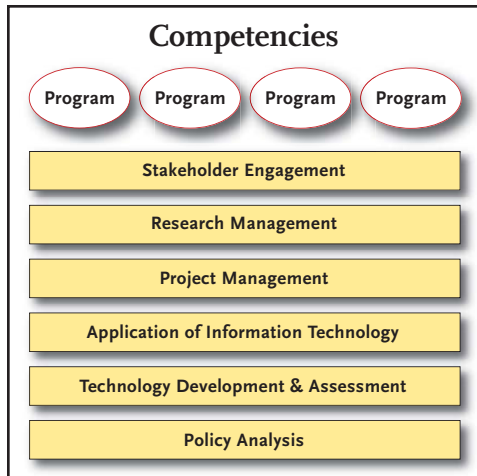


HARC often plays this bridging role, linking the producers and users of scientific information to facilitate society’s adoption of best technologies and policies. HARC has assembled a team with the technical and academic credibility to work closely with research communities while maintaining a businesslike culture that emphasizes accountability to sponsors in achieving program goals and managing research processes.

HARC’s research staff has broad experience in basic and applied science, government, technology, social science, policy analysis and the corporate sector, allowing it to respond to the needs of various practitioners. To this experience base HARC adds organizational strengths in contract management, financial accountability, project management, and stakeholder convening on behalf of project goals.

COMPETENCIES

HARC’s competencies support its mission, positioning and operating niche. Its professional staff brings together scientific, business, information technology and research management expertise to provide service to its clients.



STAKEHOLDER ENGAGEMENT

HARC can provide skills needed for convening stakeholders and managing the organizational, communications and reporting functions that are essential for many technological and public policy initiatives.

RESEARCH MANAGEMENT

HARC has experience in managing the complex logistics of large, multi-year research efforts, acting as a central coordinator serving one or more sponsors and managing the work of a multitude of subcontractors.

PROJECT MANAGEMENT

HARC strives to execute projects on time and on budget and to deliver services that meet or exceed the expectation of the client.

“HARC helps us get information into the hands of the people who need it. Their expertise with interactive mapping applications like the oak wilt information system and support hosting information resources like www.texasinvasives.org has made them an invaluable contributor to our partnership.”

Damon E. Waitt, Ph.D.
Senior Botanist
Lady Bird Johnson
Wildflower Center

“We hired HARC four years ago to assist our organization with research management. HARC is a key reason that the Texas Environmental Research Consortium is recognized as one of the best air science and policy programs in the country. HARC knows how to form bridges between scientists and policy makers and has the back-office systems to support our work.”

John Hall, Executive Director, Texas Environmental Research Consortium

INFORMATION MANAGEMENT

HARC integrates scientific information to assess and communicate policy-relevant facts. HARC employs information management specialists and innovative IT systems as part of a strategy to increase the level of understanding of regional sustainability issues. Key tools include relational databases, geographic information systems, visualization systems and Internet applications.

TECHNOLOGY DEVELOPMENT & ASSESSMENT

HARC has twenty-plus years experience developing technologies in a diversity of areas: lasers, superconductors, magnets, wood products, biomedical devices, signal processing software, databases, and Web applications. While HARC maintains niche technology development programs, its core strength is in partnering with third party developers to test, evaluate, and demonstrate promising environment-friendly technologies.

POLICY ANALYSIS

HARC has experience and competence in policy analysis, offering a multidisciplinary team structure, an intermediary positioning between the academic community and society, access to the science underlying sustainability challenges, and hands-on experience with technology solutions. HARC provides analysis in a transparent manner to all interested parties.

FACILITIES

HARC occupies a 65,000 sq. ft. facility on the Mitchell Campus, a subset of the North Harris Montgomery Community College District's (NHMCCD) 100-acre campus in The Woodlands, Texas.

AMENITIES

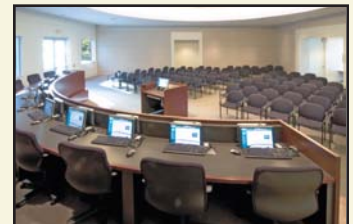
A 3,000 sq. ft. life sciences laboratory facility including molecular biological, toxicogenomic, biohazard and chemical laboratories, and a state-of-the-art tissue culture facility.

A 22,500 sq. ft. engineering high bay with fully equipped machine shop, cryogenics laboratory, high-current superconductor test facility, wood products research facility and hydrogen fuel cell test and evaluation lab.

NHMCCD's state-of-the-art conference and training facilities are available to HARC on a long-term contract for large stakeholder gatherings.



Campus



NHMCCD's conference facilities



HARC's engineering high bay.

PEOPLE

An organization's excellence is a product of its people and the organizational framework that allows them to achieve their potential. HARC is proud to say it has gathered the best people for the task of promoting sustainability science in its region.



The HARC team was assembled to build an organization in which the education, experience and working style of its staff are mobilized to address key elements of regional sustainability in a collaborative and integrative spirit.

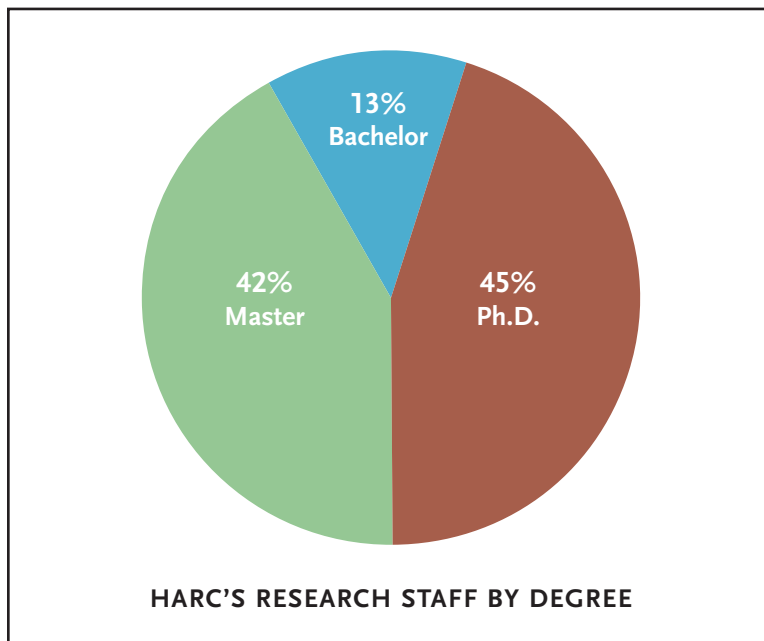
HARC has carefully built a staff whose experience spans physical sciences, engineering, and social sciences, as well as familiarity with corporate and market environments. HARC's people combine the best of the academic environment — the continuous exploration of science to

expand knowledge — with an ability to engage in timely, focused work on behalf of clients and the creativity to develop innovative sustainability solutions.

HARC's research teams are supported by a business office with decades of experience in information technology development, contract management, audited financial accountability and project management.

PROGRAM DISCIPLINES REPRESENTED

Hydrology • Ecology • Genetics & Proteomics
Architecture • Energy Modeling • Engineering
Commercial Facilities Operations • Environmental Law
Environmental Management • Forestry
Urban Planning • Transportation Planning
Air Pollution Formation and Transport
Industrial Air Emissions • Anthropology
Political Science • Environmental Economics
Information Technology • Public Policy



“Developing a useful ‘sustainability science’ will require novel approaches for research linking the natural and social sciences, and studying adaptive management and policy; for technology development and diffusion, to provide the most useful and needed tools for navigating the choices.”

“Our Common Journey: A Transition Toward Sustainability”, a report of the Board on Sustainable Development, National Research Council, 1999

HARC'S HISTORY



HARC owes its origins to the fertile imagination and initiative of Houston oilman, real estate developer and philanthropist George P. Mitchell. In **1974**, Mr. Mitchell and his wife Cynthia assembled a group of business and academic leaders who shared a common concern about global issues related to energy, food, environment, and population growth. They forged plans for a multi-year program to seek solutions, and the resulting Woodlands Conference Series began in **1975**.

Mitchell was fascinated by the ability of business leaders, government representatives and academicians to work together and produce something that was greater than the individual parts. He began discussions with Texas A&M University, Rice University, and the University of Houston to establish the Houston Area Research Center. A subsequent feasibility study, conducted by Arthur D. Little, Inc., concluded that The Woodlands was a viable location to establish a center in basic, applied, and policy research funded by contracts, grants, and gifts. In 1982, the Houston Area Research Center was founded.

In **1983**, The Woodlands Conferences and associated Mitchell international essay competitions established the groundwork for HARC's Center for Global Studies that focused on global environmental issues, sustainable development, and the social and policy implications of science and technology. HARC's first research program, a laser study of materials sponsored by the Strategic Defense Initiative program, was also established that year.

History

In **1984**, The University of Texas joined Rice, Texas A&M, and the University of Houston as founding members of the HARC consortium. The Texas Accelerator Center was formed and received \$1.6 million from the Department of Energy in support of the Superconducting Super Collider (SSC) program. A five-volume analysis of six potential super collider sites in Texas was delivered to Texas Governor Mark White the following year.

Created by an act of the Texas Legislature in **1985**, HARC's Geotechnology Research Institute (GTRI) opened to improve technology used in oil and gas exploration. NEC located its first supercomputer in North America — the NEC SX-2 — at HARC in **1986**.

In **1985** the Center for Global Studies was merged into HARC and became an operating division of the organization. The Center organized the Woodlands Conferences, managed the Mitchell Prize competition, and developed field work in Houston, the Rio Grande and Northeast Brazil.

HARC's name was changed to the Houston Advanced Research Center in **1990**, and the Texas Accelerator Center completed construction of the SSC's "first foot" — the instrument designed to discharge negative ions and send them speeding into the main accelerator ring. Construction of HARC's microwave imaging facility was completed the following year. New laboratories were opened for DNA technology and geographical information systems.

HARC, Baylor College of Medicine and MIT Lincoln Laboratory received a three-year \$2M grant from the National Institutes of Health — the National Center for Human Genome Research Institute in 1992 to develop DNA microchips for sequencing by hybridization.

In **1993**, HARC researchers set a world record for the highest current through a super-conducting cable in the HARC high-bay test facility.

In **1994**, the State of Texas awarded HARC a three-year, \$3.75 million grant to develop and test super-conducting magnetic energy storage systems. HARC initiated Houston Environmental Foresight Program, funded as part of Houston Endowments's \$1.5 million grant from The Houston Endowment, Inc. and matched by public and private funds. The program brought together decision makers, environmental groups and citizens to determine the most pressing environmental risks in an eight-county region including and surrounding Houston. HARC joined the National Academy of Sciences in its launch of The Global Commons Project to define the role of science in sustainable development. This led to publication of a groundbreaking Academy report on sustainability science, *Our Common Journey*, in **1999**.

In **1995**, working in partnership with Varian Instruments, HARC delivered the world's first actively shielded magnet for NMR spectroscopy to The University of Texas Medical Branch in Galveston. After a series of experiments, HARC laser physicists were the first to observe "lasing without inversion," a significant breakthrough in laser science.

Through the early- and mid-1990's the The Fondren Foundation provided nearly \$1 million in grants to support HARC's DNA technology programs and life sciences research infrastructure.

In **1996**, Houston Environmental Foresight published "Seeking Environmental Improvement," the results of a two-year study identifying and ranking the Houston region's most pressing environmental risks. In **1997**, HARC and the University of Houston published "A Guide to Electric Power in Texas," (the first of three editions) a report providing background and key issues for understanding the deregulation of electricity. HARC developed the Airborne LIDAR Topographic Mapping System (ALTMS) to acquire

History

elevation data of earth features in a joint project with NASA. The project's 300 flight lines generated — for the first time — highly accurate data over a 1,700 square mile area in the Greater Houston area.

Dr. Marcelo C. Andrade received the **1997** George and Cynthia Mitchell International Prize for Sustainable Development for his efforts to involve corporations in the conservation and sustainable development of tropical resources. The George and Cynthia Mitchell Young Scholars Awards for Sustainable Development were established.

From **1996–2000** the largest technology oriented university in Mexico — ITESM — teamed with HARC to conduct the first binational assessment of water and development issues in the Lower Rio Grande/Rio Bravo Basin. The study was funded by a \$900,000 EPA grant as part of the new “Science to Achieve Results” program. The final report, “Water and Sustainable Development in the Binational Rio Grande/Rio Bravo Basins” presents water management options for “doing more with less.”

In **1999**, The Center for Global Studies received a three-year grant from the Turner Foundation through the National Academy of Sciences to continue its investigation into the private sector's role in sustainability. Case studies of five multinational corporations (Ford Motor Company, Royal Dutch/Shell, Enron, Alcoa, and Formosa Plastics-Texas) examined their motivations to pursue proactive environmental strategies.

The Hewlett Foundation granted an award to the Center for Global Studies as part of a partnership with New Mexico State University and the Universidad Autónoma de Ciudad Juárez to develop a regional water policy program for the Paso del Norte region in the Rio Grande Basin. The Center received an award from the U.S. Environmental Protection Agency for “Binational Wastewater Management in the Texas/Mexico Border Region.”

In **1999**, HARC kicked off Houston Environmental Foresight Phase 2 to develop recommendations for addressing the risks identified in Phase 1: outdoor air pollution, habitat loss, lack of parks/open space, and indoor contamination.

The Center for Fuel Cell Research and Applications was created in **1998**. Funded by a consortium of electrical utilities and major energy companies, the Center evaluates fuel cell applications and determines the conditions under which hydrogen fuel cells can be used as a clean, reliable energy source.

The 76th Texas Legislature signed into law a bill expanding the scope of HARC's Geotechnology Research Institute (GTRI). H.B.2547 extended GTRI's charter to include environmental geosciences. The team responsible for developing the airborne Light Detection and Ranging (LIDAR) topographic mapping system, a joint effort by NASA Goddard Space Flight Center, HARC, and TerraPoint, LLC, received the **1999** Government Technology Leadership Award sponsored by Government Executives Magazine. Earlier that year, HARC's topographic mapping systems team and TerraPoint, LLC, received NASA/Goddard Space Flight Center's first ever achievement award in the National Resources category, recognizing NASA partners who were instrumental in the commercial development of NASA/Goddard-patented technology.

With financial support from the Hewlett Foundation, HARC's Center for Global Studies began to manage a new non-governmental organization for water planning — the Paso del Norte Water Task Force. The Task Force is made up of three urban water utilities (El Paso, Las Cruces, and Ciudad Juárez), three irrigation districts, community leaders, and large water users. A group of university experts provides research and support.

History

In **1998** Premdor International invested \$1.25 million dollars in the development of an environmentally friendly fiberboard exterior door skin. A patent for the new process — trademarked under the name HARCwood™ — was jointly awarded to HARC and Premdor in **2003**. The HARCwood™ technology received the Innovative Technology Award for Wood Treatment Processing at the New Product Showcase, 2003 Association of Woodworking & Furnishings Suppliers Fair.

In **2000**, following a careful review of programs, HARC's leaders narrowed its focus: given the needs of the region, the interests of its founder, and HARC's successful work in the field, HARC was restructured as an organization dedicated entirely to applying and further developing sustainability science at the regional level.

Today, HARC is a non-partisan, non-profit research organization dedicated to moving knowledge to action to improve human well-being and protect the environment. HARC has combined its traditional engineering and technology strength with its 25-year history addressing regional and global environmental challenges, to refocus its operating core competency: facilitating the adoption of technologies and policies that lead to a sustainable balance between human and environmental needs. Since **2000** HARC has seen steady growth in its six core program priorities and a four-fold increase in revenues. This growth is testament to the technical abilities of HARC's research staff and the development of solid business and project management systems to support the goals of its clients.

In **2005**, George P. Mitchell established the Endowment for Regional Sustainability Science. Income from this endowment gives HARC the stability to pursue in perpetuity its mission to advance technologies and policies that support regional sustainability.

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