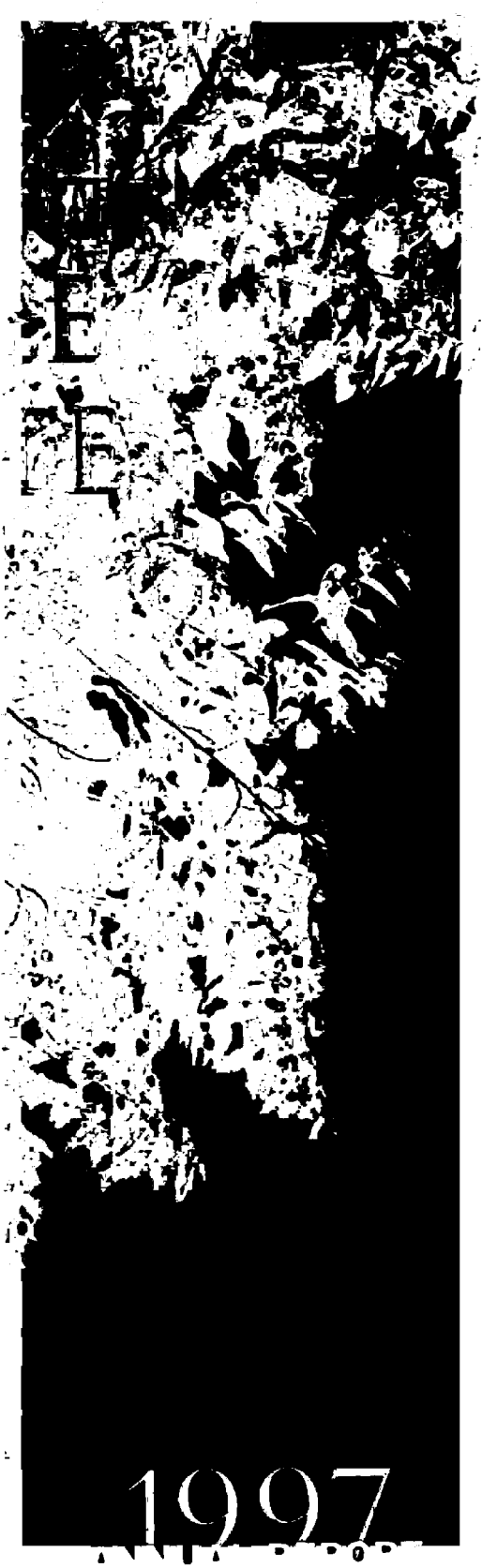
1997

PRESIDENT'S STATEMENT

Mission:
RTI is dedicated to improving the human condition through multidisciplinary research, development, and technical services that meet the highest standards of professional performance.

RTI's scientific stature has been earned through accomplishments that have helped us achieve our mission, which is to make lasting differences in the human condition through advances in public health, medicine, environmental protection, technology applications, and public policy.

Now is a fitting time to review past accomplishments and to anticipate those of the future. In 1998, we begin our 40th year of operation, ending with a milestone anniversary of RTI's founding in December 1958.

More important, however, is the ongoing dedication of the RTI staff to innovation, teamwork, and a mission-focused approach to research and technical services.

My confidence in RTI's future is inspired by that staff. With pride in past accomplishments, excitement about present initiatives, and a vision of future opportunities, they will continue to build upon an already impressive track record.

F. Thomas Wooten
RTI President
January 1998

For more information, please visit RTI on the World Wide Web (http://www.rti.org), contact listen@rti.org by e-mail, or call 919-541-6442.

Vision:
We will grow in size and scientific stature by improving our entrepreneurial environment, by being more responsive to our customers, and by respecting our mission and values.

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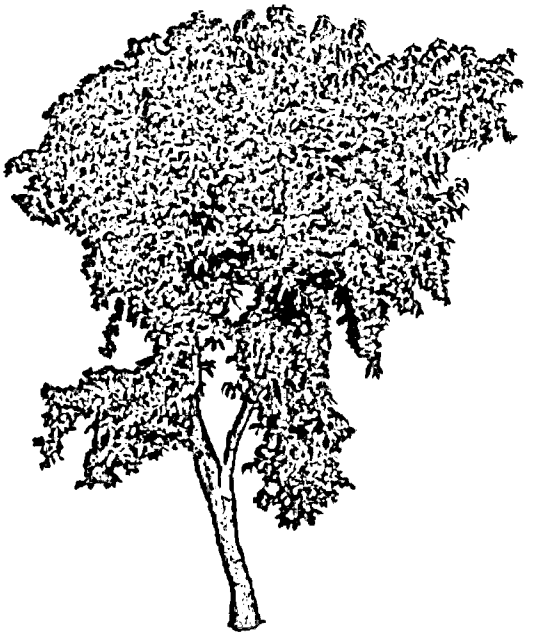
Research Triangle Institute



cover:

A Tradition of Accomplishment, A Vision of Opportunity

RTI's Monroe E. Wall, Ph.D., was honored in 1997 with the American Chemical Society's most prestigious award for pharmaceuticals R&D, the Alfred Burger Award. The discoveries of the cancer drugs Taxol® and Camptothecin™ are among the many accomplishments for which Dr. Wall was recognized. Also in 1997, RTI licensed Camptothecin compounds to Bristol-Myers Squibb Co. and entered into a research partnership with the company to develop a new generation of powerful anticancer drugs. (See page 4.) *Camptotheca acuminata*, a tree native to Asia, is the original source of Camptothecin™.

A Tradition of Accomplishment,

The five "Tradition of Accomplishment" stories in this annual report illustrate how RTI's current initiatives build upon a foundation that was laid during RTI's first four decades.

From the vantage point of this foundation, RTI looks ahead, seeing opportunities that will increase its scientific stature in all of its areas of accomplishment. For example, in environmental protection RTI is a leader not only in assessing people's exposure to pollutants via indoor air, but also in reducing exposure through new technologies and innovative pollution prevention measures.

Such examples also illustrate RTI's founding purpose: to succeed as a self-funding R&D organization that conducts research in the public interest. That purpose is reflected not only in today's vision to grow in scientific stature, but also in today's mission to improve the human condition.

RTI was established in December 1958 as the centerpiece of the Research Triangle Park, an ambitious science-based economic development initiative built upon the presence of three universities *(http://www.rtp.org)*. The term "Research Triangle" refers to these universities and the three cities in which they are located: Duke University in Durham, North Carolina State University in Raleigh, and the University of North Carolina at Chapel Hill.

Founders of the Park, who came from universities, businesses, and state government, believed that a successful research institute would make important contributions to the Research Triangle endeavor. For example, RTI would involve the universities in multi-institutional collaborative research, thus strengthening the region's scientific community. And, by succeeding, RTI would help give the name "Research Triangle" stature in scientific communities worldwide.

Because of these purposes, the three universities worked hard to nurture RTI in its early years. For example, an N.C. State professor wrote RTI's first R&D proposal in 1958, leading to a project on civilian uses of radioisotopes.

A Vision of Opportunity

The Institute of Statistics, a joint venture of UNC-CH and N.C. State, became RTI's first research program in 1959. And it was Duke engineering faculty and graduate students who helped establish RTI's semiconductor research in 1962.

Today, RTI boasts a talented staff of 1,450 people working at multiple locations in the U.S. and abroad. Their work includes the National Survey of Child and Adolescent Well-Being, two national centers for verification of environmental technologies, pharmaco-economics research for drug companies, technology development and economic analysis on energy resources, and development of insights on financing of higher education.

Also today, RTI staff collaborate with researchers from institutions around the world, in addition to those at the three Triangle universities. This collaboration furthers accomplishment of RTI's founding purposes. Examples include the RTI-UNC Evidence-Based Practice Center, joint research with Duke on auditory prostheses, R&D with an electronics company on flat-panel display technology, and a partnership with Bristol-Myers Squibb on cancer drugs.

Such initiatives, and the many others discussed in this annual report, provide the opportunities through which RTI is accomplishing its mission and realizing its vision. ■

Photos, clockwise from top left:

RTI's clients demand innovation throughout the process of discovering, developing, and marketing new pharmaceutical products. Indeed, these clients are the leaders when it comes to research, development, and outcomes assessment.

Because of its size, diversity, and team-building culture, RTI is able to deliver services throughout this process, working as a focal point for teams that bring ideas out of the laboratory and into the marketplace. As a result, RTI's volume of R&D for the pharmaceuticals industry more than doubled from 1995 to 1997, and pharmaceuticals R&D for the National Institutes of Health increased by 21% in the same period.

Because of RTI's research strengths in chemistry, pharmaceutical companies bring RTI their most challenging needs for methods development and analysis.

RTI expects rapid growth to continue, based on opportunities in drug discovery, product development services, pharmacoeconomics and outcomes research, and disease management programs.

Discovery

In 1997, RTI saw one of its most eminent scientists, Monroe E. Wall, Ph.D., receive the world's most prestigious award in medicinal chemistry, the Alfred Burger Award from the American Chemical Society. This award recognized Dr. Wall's discovery of two unique chemotherapeutic agents, Taxol® and Camptothecin™. Earlier in the year RTI entered into a licensing and research agreement with Bristol-Myers Squibb for clinical development of existing synthetic Camptothecin derivatives, as well as laboratory development of new, more powerful compounds.

RTI's emphasis on drug discovery expanded in 1997, with nine new projects. These projects focus on central nervous system active compounds, cancer chemotherapeutics, anti-infective agents, and steroids. Highlights of 1997 also include development and application of high-throughput assays for the identification of neuroactive compounds discovered at RTI using traditional and combinatorial synthetic techniques, which continues in 1998.

RTI also develops medical devices. For example, essentially all manufacturers of cochlear implants, which restore partial hearing to some profoundly deaf people, use RTI's continuous interleaved sampling technology for speech processing *(http://www.rti.org/units/es/capr.html)*. A similar concept for hearing aids is being tested with grant support from the National Institute on Deafness and Other Communication Disorders.

Development

In 1997, RTI emphasized expanding its private sector research and development activities. Major pharmaceutical companies now bring RTI their most challenging development problems. Development capabilities at RTI include preclinical studies, analytical chemistry support, clinical data collection, and statistical analysis. These are supplemented by proprietary software that facilitates data collection and analysis for challenging studies.

RTI completed eight toxicology research projects for pharmaceutical companies in 1997 and began 1998 with eight more projects already under way. The projects include congenic breeding experiments, preclinical studies, and developmental toxicology. In addition, five companies turned to RTI in 1997 for research in areas such as pharmacokinetics and methods development for pharmacological analyses.

NIH also has recognized RTI's capabilities in areas such as analytical chemistry support. In 1997, RTI received the highest possible contractor ratings, as well as a new five-year contract, for analysis of anticancer and anti-AIDS chemicals and pharmaceutical formulations. RTI's GLP/GMP-compliant work ensures the quality of drug materials at all stages of development and supports submissions for FDA review of investigational new drugs and new products. In 1997, RTI completed more than 10 such analytical and methods development projects for the private

sector. These projects dealt with products such as pharmaceuticals and nutraceuticals and ranged from bulk drug characterization to complex projects such as ion trap mass spectrometry to identify drug metabolites.

RTI provides an impressive range of statistical, data management, and data collection services to support clinical research. New projects include a data coordinating center contract with the National Institute of Mental Health for a five-year Duke University Medical Center study comparing the acute antidepressive efficacy of *Hypericum* (St. John's Wort) with a placebo and a prescription product.

Outcomes

To ensure success in today's marketplace, innovative pharmaceutical companies are demonstrating positive patient outcomes that go beyond traditional measures of safety or efficacy. Information from pharmacoeconomics, pharmacoepidemiology, and quality-of-life research helps to demonstrate that new products are cost-effective compared with competing interventions.

RTI's outcomes research team includes professionals in economics, decision analysis, operations research, market research, epidemiology, health policy, statistics, survey research, and software development, as well as consulting physicians.

Industry-sponsored research in 1997 included a retrospective epidemiology study and a pilot study of surgical outcomes. A cost-effectiveness comparison of treatments for atrial fibrillation and flutter was published in the *American Journal of Managed Care (http://www.ajmc.com/issues/Sep1997.html)*. Also, RTI completed more than 10 pharmacoeconomics studies, helping companies assess the costs and benefits of their products. (See "The RTI-UNC Evidence-Based Practice Center," page 6.)

Responding to the global needs of the pharmaceutical industry for patient data, RTI has developed research alliances around the world. During the last year, RTI conducted pharmacoeconomics studies in Europe and assessed burden of illness data in Pacific Rim countries. RTI also has international activities relating to quality-of-life measurement, clinical practice guidelines, and evidence-based medicine. One project to reformat quality-of-life instruments that are used internationally in drug trials has resulted in a set of "standard operating principles" for instrument development. In addition to accessing U.S. public use health databases, RTI also has developed collaborative relationships that provide access to private patient databases.

Leading pharmaceutical companies also are improving their products' performance through comprehensive disease management programs. These programs are educational activities targeted at persons with various chronic conditions such as respiratory disorders, gastrointestinal problems, infectious diseases, and pain and nausea. RTI's growing activities to support and evaluate such initiatives include serving as data coordinating center for one of the world's largest pharmaceutical companies. ■

A Tradition of Accomplishment

Prestigious Award Recognizes Accomplishments in Pharmaceutical R&D

With the world's most prestigious award in medicinal chemistry, the American Chemical Society has recognized RTI's discovery of two new classes of cancer chemotherapy drugs. Monroe E. Wall, Ph.D., has received the Alfred Burger Award for his career achievements not only in cancer research, but also in fields such as drugs of abuse.

Dr. Wall and his colleague Mansukh C. Wani, Ph.D., discovered Taxol® and Camptothecin™ from the bark of the *Taxus brevifolia* and the *Camptotheca acuminata* trees, respectively. They made these discoveries in the 1960s, long before research methods existed that would reveal how the compounds kill cancer cells. Even so, based on data from screening assays, Dr. Wall recognized that the two compounds had unprecedented potential, prompting him to dedicate his career to their development.

When the compounds' mechanisms of action were revealed in the 1980s, Dr. Wall's confidence was vindicated. Each compound represents a novel way of killing cancer cells, making them prototypes for two new classes of chemotherapy agents. This prompted Dr. Samuel Broder, then director of the National Cancer Institute, to hail Taxol in 1991 as the most important new cancer drug in the past 15 years.

Today Taxol is marketed by Bristol-Myers Squibb for treatment of a variety of cancers. Several companies make synthetic versions of Camptothecin. The most promising development in Camptothecin R&D, however, is the announcement in 1997 of a strategic partnership between RTI and Bristol-Myers Squibb. The company has licensed powerful third-generation synthetic Camptothecin compounds from RTI. In addition, RTI and the company are conducting joint research to develop even more powerful versions of Camptothecin.

RTI congratulates both Dr. Wall and Dr. Wani for their dedication to relieving human suffering by discovering ever-more-powerful drugs to treat cancer. *(http://www.rti.org/patents/cancer/home.html)* ■

Taxol®, a word coined by Monroe E. Wall, is a trademark of Bristol-Myers Squibb. Camptothecin™ is a trademark of Research Triangle Institute.

Camptotheca acuminata, *a tree native to Asia, is the original source of Camptothecin™.*

RTI and its clients share a simple mission: to promote healthy living. This mission is accomplished through prevention initiatives, cost-effective delivery of care, and wise investment in programs that work.

The future for this mission has never been brighter, as research is pointing the way to policies and programs that get the job done on issues such as health care, child welfare, violence and drug abuse prevention, and HIV prevention.

The underpinning of RTI's contribution to this mission consists of leadership in data collection, particularly in the face of challenges such as sensitivity of the information, complexity of the study, and the need for high-quality data.

The RTI-UNC Evidence-Based Practice Center

RTI and the University of North Carolina at Chapel Hill have joined forces to operate one of 12 Evidence-Based Practice Centers in the U.S. and Canada. Evidence reports provide the scientific foundation used by public and private organizations to develop tools for improving the quality of health care. This Center provides such reports for the Agency for Health Care Policy and Research, as well as for other public and private health care organizations. The RTI-UNC Center's first report in 1998 will be about pharmacotherapies for alcohol abuse. Such reports can span a full range of conditions, treatments, procedures, and alternative and complementary therapies. *(http://www.rti.org/epc/home.html)*

RTI is a leading innovator in technology-based methods for large sample surveys.

Program Evaluations

RTI teams with social service agencies to implement state-of-the-art demonstration projects to prevent public health problems such as the spread of HIV, youth violence, and the complications of diabetes. RTI rigorously evaluates these initiatives and shares the lessons learned with the public health community nationwide. These experiments test new ideas and provide objective analyses that support cost-effective use of limited public resources.

The Department of Health and Human Services (DHHS) has recognized four of RTI's recent evaluations as among the best performed in the nation in 1996-97. These studies focused on scientific misconduct, youth health behaviors, long-term care, and immunization.

Ongoing program evaluations at RTI include: initiatives of the Corporation for National Service; workplace alcohol programs for women, minorities, and youth; economic analyses of cosmetic and food safety issues; and violence prevention programs. In 1998, RTI will complete the groundbreaking North Carolina Cooperative Agreement for AIDS Community-Based Outreach and Intervention, an applied research project, involving substance abusers, conducted with federal and local collaboration.

Child and Adolescent Well-Being

RTI will conduct the National Survey of Child and Adolescent Well-Being during the next five years, which will make available for the first time nationally representative longitudinal data drawn from firsthand reports from children and their families or other caregivers. The study will address crucial program, practice, and policy issues in two broad areas: the dynamics of the child welfare system and outcomes such as safety and well-being. The goal is to determine the outcomes for children and families and to identify key variables that contribute to those outcomes. The study is sponsored by the Administration on Children, Youth, and Families and the Office of the Assistant Secretary for Planning and Evaluation in DHHS.

Also in 1997, RTI initiated the School Health Policies and Programs Study 2000, sponsored by the Centers for Disease Control and Prevention. In this four-year project, RTI will gather

information about school health programs such as health education, mental and physical health services, food service, and health policies.

Consumer Assessments of Health Plans

RTI leads one of three national consortia that are developing and implementing ways to provide consumers with independent comparative information about their options for health insurance. RTI has developed prototype materials to collect and share information and has begun one of several field tests to be conducted in 1998. Called the Consumer Assessments of Health Plans Study, it is sponsored by the Agency for Health Care Policy and Research and by the Health Care Financing Administration. *(http://www.rti.org/units/shsp/cahps.html)*

Substance Abuse Treatment and Prevention

Drug abuse treatment can be a cost-effective tool not only to reduce the drug problem but also to control crime associated with drug use and trafficking. Long-term studies conducted by RTI not only have shown the effectiveness of treatment but also have identified valuable approaches.

New research begun in 1997 will provide more evidence and has the potential to change the state of the art in treatment. RTI is undertaking an extensive quasi-experimental evaluation of an unprecedented national effort by the Center for Substance Abuse Treatment to establish a private-sector accreditation effort for opioid treatment programs. Meanwhile, a service patterns and outcome study on managed care for alcohol abuse, for the National Institute on Alcohol Abuse and Alcoholism, continues through the year 2000.

During 1997, RTI released new results indicating that, over the course of four years, drug prevention programs had only a small impact on student drug use and attitudes toward drugs. "School-Based Drug Prevention Programs: A Longitudinal Study in Selected School Districts" found that success, while rare, is associated with programs that offer a wide variety of well-coordinated prevention activities sustained over multiple years.

RTI is helping six U.S. states (Louisiana, Maine, Missouri, North Carolina, North Dakota, and Vermont) collect information that is vital when allocating scarce resources for preventing and treating drug abuse. RTI helps these states develop needs assessment systems and conducts (or assists with) the initial round of data collection.

RTI has conducted the National Household Survey on Drug Abuse since 1988, providing information that guides decisions and research on how to use resources for drug abuse prevention and treatment. Results of the 1997 survey will be released in the third quarter of 1998. RTI is contracted to continue conducting these surveys. *(http://www.rti.org/publications/cre/drug_prev_eval_biblio.html)* ■

Vietnam veterans were the focus of RTI's landmark PTSD study.

A Tradition of Accomplishment

Post-Traumatic Stress Disorder

The Veterans Administration called it a "landmark" study. The results compelled Congress in 1989 to provide psychological treatment to veterans diagnosed with post-traumatic stress disorder (PTSD). At RTI, the study set a standard for research on military-related health issues and for research on PTSD in civilian settings.

Today at RTI, both topics are key components of public health research. In research to improve drug-abuse treatment for women, RTI is using PTSD assessments at the outset of treatment. To better understand and assist women on probation, RTI has added PTSD to the parameters under study. In addition, RTI is the data coordinating center for a project to demonstrate and evaluate HIV/AIDS mental health services, in which PTSD is a key issue. Although most trauma is associated with veterans, these three projects are revealing the impacts of trauma from other sources, such as child abuse and crime victimization.

Military health studies at RTI include the 1998 Worldwide Survey of Health Related Behaviors among Military Personnel, the fourth such study RTI has conducted for the Department of Defense since 1988. RTI also is conducting two studies focusing on the health status of women in the military and how health affects outcomes such as individual performance. In a new project, RTI is collaborating with researchers at the Southwestern Medical Center in Dallas on a comprehensive study of Gulf War Syndrome.

RTI's Vietnam veterans study is available as: ***Trauma and the Vietnam War Generation: Report of Findings from the National Vietnam Veterans Readjustment Study,*** R. A. Kulka, W. E. Schlenger, J. A. Fairbank, R. L. Hough, B. K. Jordan, C. R. Marmar, & D. S. Weiss. (New York: Brunner/Mazel, 1990.) ■

As innovative companies seek competitive advantage by being the early adopters of new technologies, a deciding factor in their success is an alliance with a trusted and independent technology partner.

The future promise of RTI's work can be seen in its successful partnerships in visualization, aerospace technologies, semiconductor materials, and energy technologies (page 13).

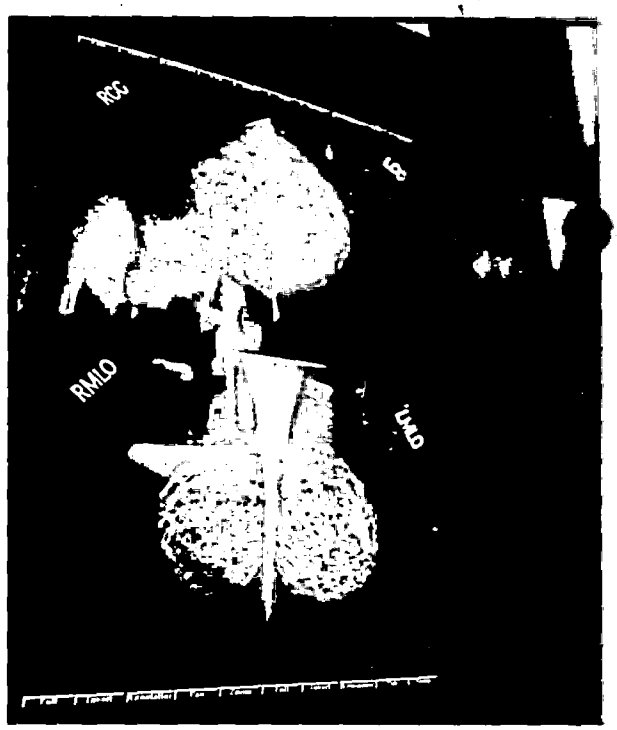
Innovation in RTI's laboratories is one key to this success. Of equal importance, however, is RTI's long-standing leadership in a market-driven approach to technology management and technology transfer. Combined, these capabilities ensure that RTI and its clients achieve their shared mission to realize the promises of Information Age technologies.

Technology Management

For over 30 years, RTI has successfully helped corporate and government clients develop new commercial applications for their technology. Commercialization accomplishments in 1997 included helping companies commercialize technologies for public safety, medical devices, advanced materials, manufacturing systems, and sensors. RTI's track record is based on: nationally recognized technology management practices in technology assessments to determine applications and commercial potential, technology valuation and marketing, market opportunity analysis, and commercialization planning and partnership development.

For example, three companies are conducting clinical testing in 1997-98 of digital mammography systems that are based on technologies from federal laboratories. With support from DHHS, RTI identified these technologies and brokered partnerships through which the companies developed the systems. Continuing this work in 1998, RTI is seeking more imaging technologies and corporate partners to make them a clinical reality.

RTI also helps companies manage the innovation process. In 1997, RTI developed an Internet-based self-assessment tool to help companies improve how they practice technology innovation. Innovation Insights™, a benchmarking tool, measures how well the technical staff and management listen to customers, share ideas and know-how within the company, and use outside technology to leverage R&D. Innovation Insights reveals to management whether the company culture encourages innovation. Currently in pilot testing with several Fortune 500 companies, Innovation Insights will become widely available in 1998. *(http://www.rti.org/technology/home.html)*



Digital mammography is in clinical testing, thanks to RTI-brokered technology management.

Virtual Reality

RTI's VR program provides practical leadership in a field driven by futuristic ideas. RTI started in 1993 with the Dresden Frauenkirche model for IBM-Germany, the most complex real-time VR model of its day. Today RTI makes VR practical by pushing the technology's limits in terms of model complexity and simplicity of the computer platforms on which models operate. Using the latest ideas from university and corporate labs, RTI develops practical applications for training, marketing, and visualization.

Tank mechanics in the National Guard are learning faster, better, and at lower cost than ever before thanks to VR-based training developed at RTI. A November 1997 report demonstrated these benefits, plus others such as the ability to train more students at once. In 1998, RTI will complete a VR trainer for emergency medical technicians.

Now that the success of these approaches has been established, the private sector is taking an interest. RTI started its first industrial training applications in 1997, including one for Michelin.

Michelin's booth at the 1997 Detroit Auto Show, voted by attendees as one of the show's best, used an RTI-developed VR racing car to introduce a new line of racing tires. RTI's theme of pushing the limits of VR technology is consistent with Michelin's image. As a result, a much more elaborate VR racing car was unveiled at the 1998 Auto Show. *(http://www.rti.org/vr/home.html)*

Aerospace

RTI engineers were instrumental in discovering the latent potential of airborne weather radars to give pilots early warning of the violent downdrafts that have caused some of the worst accidents in aviation history. These predictive wind shear radar systems are now mandated equipment on all commercial airliners in the U.S.

A future contribution is a ground-based system to detect wake vortices, the miniature "tornadoes" created by moving aircraft that can destabilize aircraft that encounter them. RTI engineers were major participants in NASA field programs to demonstrate the ability of lidar sensors for wake-vortex detection.

A demonstration is planned in 1999 of the External Vision System, a system that will allow pilots of the future to "see" outside a windowless cockpit. RTI engineers are principal participants in developing the radar sensor for this mission.

For over four years RTI has provided systems engineering support to an industry-government consortium to revitalize the U.S. general aviation industry. A major RTI contribution to this effort is the flight simulator used by the consortium to show advanced concepts to the public.

As a leader in launch safety analysis, RTI has provided research and technical services to the U.S. Air Force since 1985 and to the Department of Transportation Office of Commercial Space Transportation since before its inception in 1990. One highlight of these activities is the RTI-developed "facility DAMage and Personnel injury" (DAMP) program, now accepted as the industry standard for assessing launch safety. With explosive growth in demand for access to space, RTI finds itself concerned with the safety of commercial spaceports, novel launch concepts, commercial versions of military rockets, and low-cost reusable launch vehicles. *(http://www.rti.org/units/es/cat.html)*

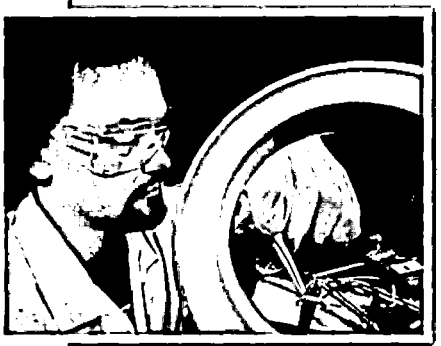
Semiconductors

RTI's strength in space power systems dates to 1978, when RTI engineers demonstrated the first monolithic cascade solar cell, a device that extracts power from multiple segments of the solar spectrum. In 1997, RTI and a leading space power systems manufacturer introduced a variant of this technology into the marketplace.

Teaming with the Department of Physics at N.C. State University, RTI explored and demonstrated a remote plasma-enhanced chemical vapor deposition technology for low-temperature deposition of microelectronic materials. RTI later invented a high-power RF plasma technology and used it to make low-cost industrial diamond and high-reliability polycrystalline thin film transistors for advanced displays. RTI is helping a manufacturer move this application into commercial production.

Research on thin-film superlattice materials confirms application of these structures for solid-state thermoelectric refrigeration. This technology could become an efficient substitute for conventional refrigeration.

RTI also has demonstrated the first of several monolithic integrated circuits and invented a new structure for heterojunction bipolar transistors. These accomplishments, from research in high-speed compound semiconductor materials, have the potential for integrated circuit technologies with clock rates of 100 gigabits per second. *(http://www.rti.org/units/es/csr.html)* ■



Today, RTI's fundamentals extend to a wide variety of semiconductor materials and applications.

A Tradition of Accomplishment

"Fundamentals of Silicon Integrated Device Technology"

Published in the 1960s when integrated circuit technology was in its infancy, this 16-part series became the standard reference in its field by delivering exactly what its title promised to scientists and engineers. RTI produced the series for the Air Force, and in 1967-68 Prentice-Hall published it in two volumes.

Fundamentals became popular at a time when integrated circuit technology was more art than science. The series remains in use today for postgraduate teaching on the theory and practice of integrated circuit manufacturing. One reason for its long-lived value is its emphasis on fundamentals—mathematics and basic physics—instead of then-current technology.

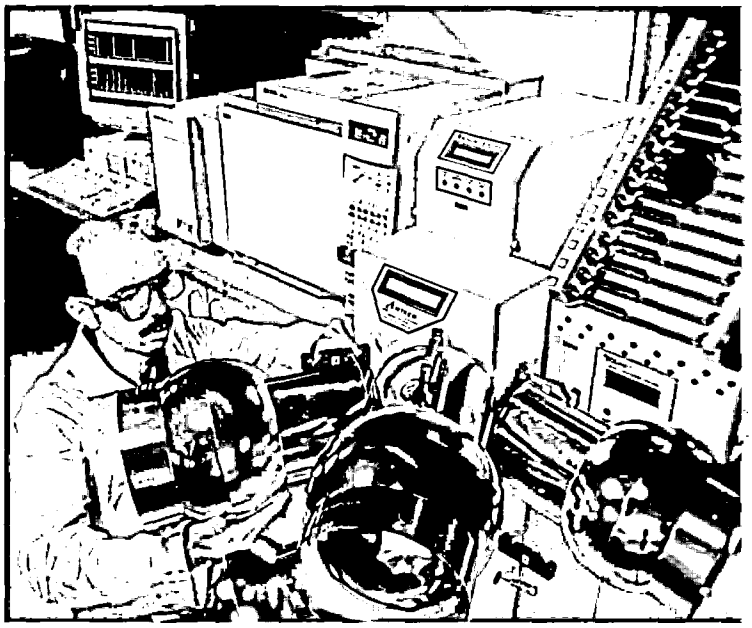
In the 1970s, RTI began investigating the fundamentals of III-V materials as the basis for devices that could surpass silicon technology in speed and power. By the middle 1980s, RTI, along with local universities, had become a national center for III-V compound semiconductor research, working on applications for integrated circuits, optoelectronics, and photovoltaics. This program has since expanded into R&D on synthetic diamond materials.

Today's semiconductor research, described on these pages, builds upon this tradition of fundamental research with R&D that brings unprecedented speed, power, and efficiency to electronic technology. ■

Through informed management of the environment, RTI's clients make choices that maximize benefits to human and ecological health within the limits of economic and technical feasibility.

RTI's accomplishments empower decisions related to all environmental media. Decision makers, from national regulatory authorities to individual homeowners and factory operators, need reliable information on environmental measurements, health and ecological risks, and economic analyses.

RTI commits the full range of its multidisciplinary resources to environmental research and brings an extensive record of R&D accomplishments to bear on environmental issues and problem solving.



Measurement technology developed at RTI supports sound decision making for environmental protection.

Environmental Technology

RTI's patented direct sulfur recovery process and environmentally responsible methods for surface cleaning top a long list of accomplishments in technologies that control and prevent pollution. Based in part on this record, the Environmental Protection Agency has awarded RTI two Environmental Technology Verification projects, among only 12 such projects nationwide. RTI will provide independent assessments on the effectiveness of technologies for controlling both ambient and indoor air pollution.

RTI's future opportunities include research in biotechnology, energy (page 13), atmospheric sciences, multimedia modeling, and surface and materials sciences. These opportunities also include continued participation in international and industrial environmental R&D programs.

Environmental Assessment

Both government and industry turn to RTI for research that measures the health effects of chemicals in the environment.

During 1997, RTI completed 30 toxicology research projects for companies that must ensure that their products meet strict standards of environmental responsibility. Through fundamental research for government agencies, such as the National Institute of Environmental Health Sciences, RTI remains at the leading edge of new methods and the development of unique research and testing protocols. For example, through 2001, RTI is conducting developmental toxicology research and testing for NIEHS. In 1998, RTI expects to complete R&D on a new assay that uses brine shrimp to assess chemical effects in pregnant mammals. This method promises to reduce use of animals in toxicology testing, as well as reduce costs.

For EPA, RTI conducts the National Human Exposure Assessment Study to provide risk assessment data and to characterize people's exposure to chemicals in air, water, food, and dust. This information provides the link between environmental measurements and health effects research by revealing the amount of chemicals actually absorbed by the human body. In 1997, RTI completed a project for the private sector, helping determine exposure to manganese from vehicle exhausts. In a three-year project starting in 1998, RTI will research human exposure to arsenic species, especially through dietary sources.

Environmental Measurements

Traditionally a leader in environmental methods development, RTI is meeting the challenge of measuring tiny particles, less than 2.5 μm in diameter, that may contribute to adverse health effects. The challenge is to determine how to collect and characterize these particles. RTI staff worked with EPA to develop the federal reference method specifications, designed the sampler, and authored the particle monitoring chapters for EPA's proposed regulations of these small particles. RTI also serves as the technical consensus builder between EPA and stakeholders in the $PM_{2.5}$ measurement technology debates that will take place prior to implementing regulations in 2002 (RTI *Hypotenuse* magazine, January '98).

Another challenge is the measurement of volatile organic air emissions from hazardous waste treatment, storage, and disposal facilities. RTI developed Method 25D (Code of Federal Regulations 40, Part 60), which replaced more complex, expensive procedures. RTI also developed Method 305 (CFR 40, Part 63), which measures individual hazardous components in wastes. RTI has validated this method for more than 50 compounds, and additional validations are ongoing. Also in 1997, RTI published a new method for measuring volatile organic compounds and carbon dioxide in consumer products (NTIS document PB-97-143143 INF).

In addition to methods development, RTI is a leader in quality assurance. RTI was instrumental in developing, and now using, the Data Quality Objectives approach. DQOs specify the type, amount, and quality of data needed to make reliable environmental decisions. This approach prevents mistakes that might waste effort on oversampling or, conversely, provide inadequate data to support informed decisions.

Decision Tools for Environmental Management

When making environmental management decisions, the quantity and variety of information to be considered is overwhelming. RTI decision tools are at work internationally on topics such as river management, preventing toxic air emissions, and choosing environmentally responsible coatings (RTI *Hypotenuse* magazine, May/June '97).

RTI is also a leader in risk assessment and economic analysis for environmental management. RTI helps EPA offices provide comprehensive research and technical services in risk-based decision making. Ongoing economic analyses include assessing the benefits and costs of Agency programs instituted under the Clean Water Act, Clean Air Act, TSCA, SDWA, and RCRA. RTI is examining the effects of replacing traditional source-specific and media-specific environmental permitting approaches with innovative, more flexible, facility-wide permits. RTI is evaluating the benefits of protecting drinking water, the use of innovative environmental management policies, and comprehensive ways to measure environmental quality achievements.

In 1997, RTI and the Remedial Technologies Network released the Remediation Information Management System *(http://www.remedial.com)*. Subscribers use this comprehensive library of remediation technologies to explore their options for cleaning up contaminated sites, such as brownfield projects.

RTI also released, through the National Academy of Sciences, a decision tool for choosing pavement marking materials that meet engineering, environmental, and worker safety requirements. (NCHRP report 392, *http://www.nas.edu/trb/index.html)*

The River Management Decision Support System, RIMDESS, is one of a family of PC-based systems that integrate information on water users, waste dischargers, pollutant loading, water quality, hydrology, regulations, treatment costs, and models to analyze data and present results to decision makers. It is being used in three river basins overseas, and RTI is developing applications in the U.S., including for North Carolina's embattled Neuse River.

Another new tool, WATER8, uses air and water models to estimate organic compound air emissions from water treatment facilities. (See also: *clean.rti.org* and *cage.rti.org)* ■

A Tradition of Accomplishment

Revealing Indoor Air Pollution

The Total Exposure and Assessment Methodology (TEAM) studies, initiated by RTI for EPA in the 1970s, represent the first use of statistically sampled populations to unravel the relationships between an individual's exposure to toxic substances and the amount of these substances that is absorbed by the body and has the potential to harm health.

During a pilot project in New Jersey, North Carolina, and North Dakota, a remarkable discovery emerged. For almost all chemicals of interest, exposures measured by personal monitors worn by people were higher than values taken from fixed outdoor monitors. The implications were clear, because the people in the study, like most Americans, spent 70% to 90% of their time indoors. Even in unpolluted locales, it was found, indoor air would not meet basic air quality standards.

From the TEAM results emerged a new emphasis on understanding and preventing indoor air problems. RTI itself has conducted dozens of indoor air research projects.

Today RTI's research includes not only exposure and risk assessment, but also methods, instrumentation, and model development and pollution prevention—all needed to analyze and address the health impacts of indoor air quality. ■

Today's monitoring systems (top photo) are smaller and more versatile than those used in the 1970s (bottom photo).

RTI helps communities and nations develop sustainable capacities to provide needed services to the public in population and health, regional development, education, environmental management, and public services such as utilities and transportation.

These communities are in the U.S., in emerging democracies, and in developing countries. They all envision a bright future in which their citizens have the best possible opportunities for success and excellence.

RTI's contribution to this future comes through research, analysis, information gathering, and an institution-building approach. By applying state-of-the-art evaluation and data collection approaches, RTI provides timely information to support policy-making decisions. By teaming with service providers, conducting rigorous evaluations of the resulting initiatives, and providing training and decision tools, RTI creates projects that meet immediate needs and build in-place capacity to meet future needs.
(http://www.rti.org/units/ssid.html)

Research on financial aid provides data needed to help ensure students' success in higher education.

Government Performance

By the year 2000, half of the world's population will live in urban areas, creating unprecedented demands for basic services.

RTI works throughout the world on municipal management and finance, infrastructure, local economic development, urban environmental management, democracy and governance, decentralization, and urban service delivery. Funding comes from the U.S. Agency for International Development (USAID), the World Bank, the United Nations Development Programme, the Asian Development Bank, the Inter-American Development Bank, and host country governments.

RTI's work in the former Soviet Union has changed the way many cities respond to citizens. Cities assisted by RTI have become models of an open government that provides sustainable, efficient urban services. New projects started in 1997 will continue this work in more communities.

RTI has pioneered the integration of environmental management into local decision making. Through 2001, RTI will carry out the "Coordinated Local Environmental Action Network (CLEAN-Urban) Activity" project, helping Indonesian cities develop their capabilities to finance and manage urban infrastructure. RTI also has helped Ecuador and Tunisia achieve significant improvements in environmental health conditions. And RTI was recently recognized by the Government of Poland for a remarkable success story that has established a self-sustaining resource to empower local environmental decision making.

Population and Health

RTI's commitment to international health, population, and family planning is based on the premise that high mortality, fertility, and population growth rates are critical obstacles to achieving development goals. RTI helps countries develop skills and tools to sustain family planning and health care programs.

For example, Zambia has embarked on daring reforms to deliver an "essential package" of services on maternal health, family planning, sexually transmitted diseases, child health and nutrition, malaria, tuberculosis, and water and sanitation. RTI is helping the nation set goals and communicate them to donor agencies.

Energy Technologies and Decisions

Competition spawned by deregulation, new pressures to reduce air emissions, and multiple options for new technologies all confront the producers and users of energy (RTI *Hypotenuse* magazine, November/December '97).

For example, a 1% improvement in operating efficiency of electric motors would reduce electric bills by $1 billion and cut CO_2 emissions by 15 million tons per year. RTI has developed a fuzzy-logic controller that achieves efficiency improvements of 2% to 15% with variable-speed motors. RTI now is packaging the technology as affordable hardware for retrofitting existing motors.

RTI also has demonstrated a wood-fueled electric generating plant and has developed clean-coal technologies that increase efficiency and reduce emissions. In an ongoing project, RTI and a team of Russian scientists are developing applications of hydrogen. The U.S. Army has supported development of portable hydrogen-fueled systems such as a portable water desalination unit.

Putting such technologies to work requires product, service, and pricing decisions. RTI helps electric utility companies make such decisions as they face retail competition and as their customers face unprecedented choices. Working with the Electric Power Research Institute and other utilities, RTI provides information about how customers value different rate plans, contracts, and supply and customer service arrangements. Utilities use this information to assess customer reactions to hypothetical pricing and service options. RTI has also developed software to assess the market potential of competitive threats and to provide business intelligence on developments among key customers and competitors.

Supporting Education and Training in the U.S.

From the performance of individual elementary schools to the delivery of financial aid to college students, RTI research and technical services guide decisions that are critical to the development of human resources in the U.S.

Data from the 1996 National PostSecondary Student Aid Survey (NPSAS), conducted by RTI for the U.S. Department of Education, were released in 1997. The survey provides information on how students finance their education, how financial aid works, and how aid affects students and their families. *(http://nces.ed.gov/surveys/npsas.html)*

Additional insight will come from the Beginning Postsecondary Students longitudinal study, which will follow a subsample of NPSAS students who started their postsecondary education in 1995-96. *(http://nces.ed.gov/surveys/bps.html)* This study will provide data on: persistence in, and completion of, postsecondary education; the relationship between work and education; and the effect of postsecondary education on individuals' lives.

Meanwhile, RTI continues its longitudinal evaluation of the Vocational Rehabilitation Service Program. So far, interim reports reveal that about 70% of participants give it high marks. The final report in 1999 will address key issues such as the long-term economic and human impact of the program.

In North Carolina, RTI is focusing on critical issues in child development such as training caregivers on early childhood brain development and working with local communities to evaluate the effectiveness of the state's "Smart Start" initiative for preschoolers. ■

A Tradition of Accomplishment

Educational Reform in South Africa

At the opening session of parliament in 1991, South African President F. W. de Klerk announced that apartheid would be dismantled. At the time, the country's education system underserved most South Africans because it was skewed toward educating the ruling minority. Negotiations on reform, however, were slowed by a lack of data.

RTI researchers stepped in to help negotiators gain the technical ability to develop viable policy options. RTI equipped participants with policy support tools such as data analysis and reporting models.

From 1991 to 1995, RTI and its partner, the Education Foundation, used these models to initiate, facilitate, and inform a nationwide dialogue about education reform. The results included agreement on key elements of the new education system and an easier transition to new leadership. Moreover, that leadership had developed an emphasis on numerically based objective analysis, a solid basis for future governance.

In 1997, RTI began a five-year project, sponsored by USAID, to assist South Africa with ongoing education reforms as well as new projects in Guinea and Egypt.

Recognizing this success and similar success stories in Haiti, Ecuador, Namibia, and Swaziland, USAID asked RTI to document its approach. The result is a six-volume series on education reform published in June 1997. ■

RTI's efforts have given South Africa's children a voice in education reform.

RTI's vision of growth and increasing scientific stature depends upon continuing its traditions of painstaking cost management, successful technology transfer, and wise investment in research capabilities.

Revenue from research projects grew in 1997 to $148.2 million. Rapid growth continued in the volume of services provided to commercial clients, as well as to clients such as international development organizations and U.S. state governments. Combined revenue from these clients grew by 23.3% from 1996 levels, to $23.5 million. Research project revenue from U.S. government agencies grew by 0.3%, to $124.7 million.

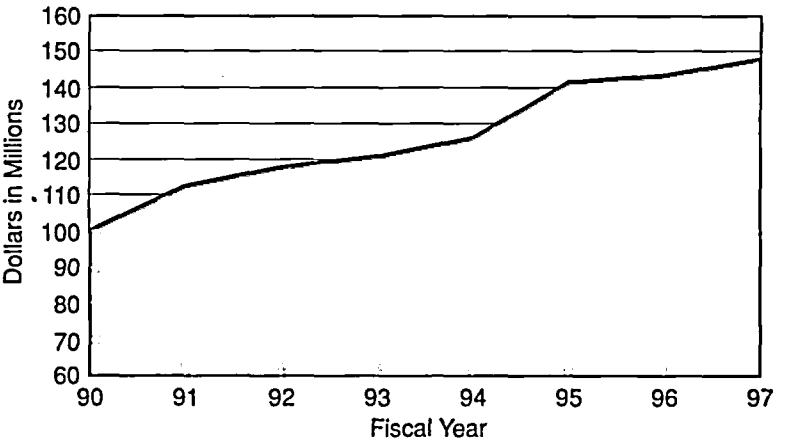
A key strategy in support of RTI's vision is to expand resources available for investment, in part through intellectual property income. Significant technology transfer accomplishments in 1997 are yielding such income, most notably for cancer drugs licensed to Bristol-Myers Squibb (page 4).

Net income declined from 1996 to 1997. ■

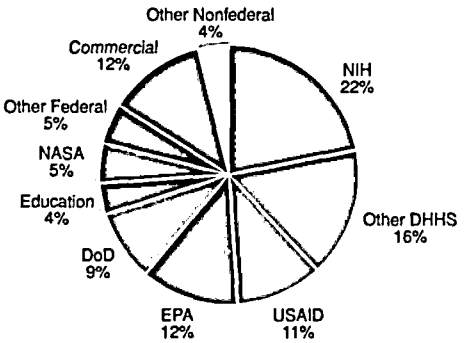
Summary Income Statement

		1997	1996
Revenue from research projects		$148,220,986	$143,399,321
Other income		1,542,727	775,883
less:	Project labor	(48,531,103)	(47,395,278)
	Other project costs	(45,628,350)	(43,229,391)
	Indirect costs	(50,970,788)	(48,551,433)
Net income		$4,633,472	$4,999,102

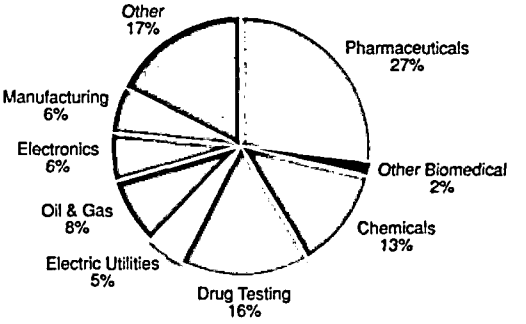
RTI Revenue



Sources of Revenue, 1997



Commercial and Other Nonfederal Revenue, 1997



Board of Governors

Of the 30 Governors, five hold seats by virtue of their positions: the presidents of The University of North Carolina, Duke University, and the Research Triangle Institute and the chancellors of N.C. State University and the University of North Carolina at Chapel Hill; three are specified in the Bylaws: William C. Friday, Marcus E. Hobbs, and William F. Little; nine are appointed annually to represent Duke University, The University of North Carolina general administration, N.C. State University, and UNC-Chapel Hill; up to 15 Governors are selected from the business and scientific communities.

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The Members are the equivalent of RTI shareholders. As such, they elect the Governors who represent the business and scientific communities.

The Members of the Corporation include: the chairmen and presidents of The University of North Carolina and Duke University, and representatives elected annually from and by the Duke University Board of Trustees and the Board of Governors of The University of North Carolina.

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Research Triangle Institute

Research Triangle Institute is an independent research organization that serves clients in the U.S. and abroad. With a staff of 1,450, RTI conducts research in advanced technologies, public policy, environmental protection, and public health and medicine.

RTI was founded in 1958 as the initial R&D center in the Research Triangle Park. Three universities worked together to establish RTI, and close ties are maintained with these universities through collaborative research, adjunct appointments, and other professional interactions.

Social Sciences and International Development

Applies economic, sociological, psychometric, and policy analysis methods to develop policies for governments and companies. Studies education, social welfare, environmental protection, public utilities, and economic development.

Statistics, Health, and Social Policy

Conducts collaborative research on public health, medical, environmental, social, and other areas of public policy and research. Designs and carries out scientific sample surveys, epidemiologic studies, community-based research, and clinical research. Provides evaluations of products and programs for public and private-sector sponsors. Evaluates the effectiveness of national, regional, and local initiatives. Provides specialized data capture, management, and analysis for statistical, social, and policy research.

Chemistry and Life Sciences

Designs, synthesizes, and assesses pharmaceuticals and agricultural, industrial, and environmental chemicals. Performs research in synthetic and bioorganic chemistry, metabolism, immunology, toxicology, and polymers.

Analytical and Chemical Sciences

Develops fundamental analytical methods and applies them in research on pharmaceuticals, pollutants, toxicology, and industrial processes.

Electronics and Systems

Develops and applies electronic technologies for achieving financial advantages in aerospace, manufacturing, and medicine. Technical areas include materials and devices, reliable high-performance systems, graphics, communications, automation, software engineering, and computational intelligence.

Environmental Sciences and Engineering

Develops basic information, regulatory strategies, and new technologies for environmental protection. Provides environmental measurements, quality assurance, risk assessment, technology assessment, chemical engineering, indoor and outdoor air quality analysis, pollution prevention, and contamination control.

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For more information,
please visit RTI on World Wide Web (www.rti.org).

The web site features access to many of our papers and research reports, as well as RTI *Hypotenuse* magazine. The magazine summarizes research accomplishments and initiatives, providing contacts, web sites, and publications that are available.