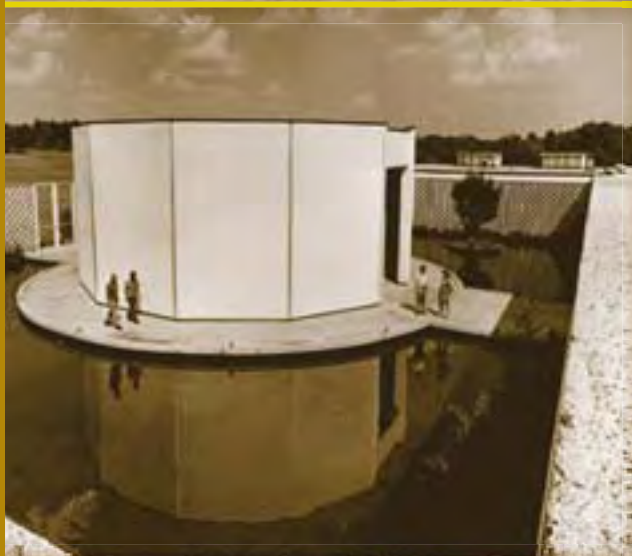




*Celebrating 50 years of turning
knowledge into practice*



Annual Report 2008



In the photo on page 1, RTI's first president, George R. Herbert, surveys what is now RTI's 180-acre, 18-building campus in Research Triangle Park, NC. The photos on this page show RTI's campus at different times during its 50-year history.

Introduction

Since our founding in 1958, thousands of dedicated RTI staff members have pledged themselves to our mission of conducting research and providing technical services that improve the human condition.

This year, we are proudly celebrating 50 years of turning knowledge into practice.

We owe every achievement in FY2008 to the teamwork and technical innovation of our staff, and we honor their dedication to the pursuit of independent inquiry, objectivity, and excellence across an extraordinary range of projects.



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President's Message



Fifty years ago, a group of visionary leaders set out to create a research institute in central North Carolina to address complex scientific challenges facing America's changing society and the world. Today, their vision—along with our mission to improve the human condition by turning knowledge into practice—remains the guiding force behind RTI International's success.

In the past five decades, our scientists and researchers have completed more than 10,000 projects in areas ranging from health and pharmaceuticals to education, advanced technology, and international development. We are proud of our more than 4,200 professionals around the globe whose efforts each day improve health care, enhance educational opportunities, strengthen democracies, and advance the frontiers of many scientific fields.

Like our founders, however, we remain focused on the future—its challenges and its opportunities. During fiscal year 2008, we strengthened our capabilities in global health, energy and climate change research, and the development of sustainable economic and social programs, as well as many other fields.

This year, a team of world-renowned researchers from the Women's Global Health Imperative at the University of California, San Francisco joined RTI, significantly enhancing our abilities to address gender inequalities and health challenges on

a global scale. We spun off a commercial company called siXis, whose technology allows circuits to be densely packaged onto a silicon substrate, greatly increasing microprocessing efficiency. We also began a 10-year project to manage environmental services for the government of Abu Dhabi and to transfer to local experts the knowledge needed to operate a world-class environmental protection program.

RTI enjoyed a successful business year in 2008, with annual revenue of more than \$709.7 million, an increase of almost 16 percent over FY2007 revenue. Our strong financial position this year allowed us to complete construction of a new building, which is designed and constructed to meet the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) standards.

As we celebrate our 50th anniversary year, we do so with tremendous respect for the thousands of current and former staff members whose entrepreneurial spirit, determination, and professionalism contributed to our success during the past five decades. Their scientific and technical accomplishments have earned us the proud reputation we enjoy today and serve as our model as we look forward to the next 50 years.

Victoria Franchetti Haynes

Victoria Franchetti Haynes
President and CEO
RTI International



“... to encourage, foster, conduct and contract to conduct investigations and research in such sciences; and to publish or disseminate where appropriate information and data arising from such investigations and research.”

—Research Triangle Institute Articles of Incorporation, December 29, 1958

Health Research



Public Health and Policy Research

Helping Policy Makers Make Informed Decisions

As part of our efforts to turn knowledge into practice, RTI researchers often testify before Congress to assist policy makers in making informed decisions.

During FY2008, RTI Senior Fellow Thomas Hoerger, PhD, testified before the U.S. House Committee on Oversight and Reform, explaining to members that costs of a federally funded program to screen low-income women for breast and cervical cancers are roughly equivalent to those of other similar screening programs.

Hoerger's comments were based on a first-phase cost analysis conducted jointly by RTI and the U.S. Centers for Disease Control and Prevention's

For more than 50 years, a significant part of RTI International's research has focused on all aspects of human health, including informing public policy, finding effective behavioral interventions, understanding diseases, and sharing that knowledge with populations around the world.

During FY2008, RTI researchers continued to share their knowledge and expertise from Alaska to Uganda, helping policy makers make informed decisions, calculating the costs of chronic diseases, enhancing military mental health, and establishing a standard set of core measures for genome-wide association studies.

(CDC's) National Breast and Cervical Cancer Early Detection Program (NBCCEDP).

The study analyzed the costs associated with the program, which was established by Congress in 1990 to deliver screening for breast cancer and cervical cancer to medically underserved, low-income women.

Hoerger, director of the RTI–University of North Carolina Center of Excellence in Health Promotion Economics, reported that “there was wide variation in the programs sampled from state to state in terms of organization, reliance on in-kind contributions, and the number of women served. These and other factors contributed to a fairly wide variation in costs.”

RTI researchers are working with researchers at CDC to conduct a second phase of this study, which will provide a more comprehensive examination of the costs associated with screening in the NBCCEDP.

The study is examining all 68 NBCCEDP programs operating in the United States and is expected to be completed during 2009.

“We will test for economies of scale and be able to control for differences in cost of living between programs,” Hoerger told the committee. “The data may allow us to identify best practices and learn more about the optimal mix of spending across program activities.”

Hoerger also testified before the U.S. House Ways and Means Committee's Subcommittee on Health during FY2008, discussing the results of RTI's evaluation of competitive bidding for Medicare durable medical equipment.

Studying the Safety of BPA and Other Chemicals

In June 2008, RTI released results of a multigenerational reproductive toxicity study of dietary bisphenol A (BPA) that was funded by the Plastics Division of the American Chemistry Council.

Our study showed no adverse health effects from low-dose exposure to BPA in rats or mice.

Published in the August issue of *Toxicological Sciences*, the study is the largest and most comprehensive study to date to assess the potential health risks of oral or dietary exposure to BPA. Our results indicate that low-dose oral exposure to BPA—below, at, and above the range humans are presumably exposed to BPA—did not affect prenatal or postnatal development or reproductive development, structures, or functions in multiple generations of mice.

Researchers conducting the RTI study administered oral dietary BPA (the human exposure route) over a wide range of doses and assessed the systemic, reproductive,

and developmental effects over two generations. Researchers determined that because BPA ingested orally is rapidly and efficiently metabolized in the intestines and liver before it reaches the bloodstream, low oral doses result in little or no internal systemic exposure.

“We conducted these studies in response to the continuing societal, scientific, and international regulatory concerns about the safety of BPA,” said RTI Distinguished Fellow Rochelle Tyl, PhD, DABT. “Our study showed no adverse health effects from low-dose exposure to BPA in rats or mice.”

The effects of exposure to low doses of BPA reported in small, basic research studies have not been replicated in rigorous, governmental testing guideline studies using oral administration, such as the guideline multigenerational studies RTI performed.

RTI’s findings were accepted as part of a comprehensive risk assessment

required under a European Community regulation known as REACH (for Registration, Evaluation, Authorisation, and Restriction of Chemicals).

RTI is a leader in chemical safety assessment services required under REACH, which confers greater responsibility upon industry for managing risks associated with chemicals.

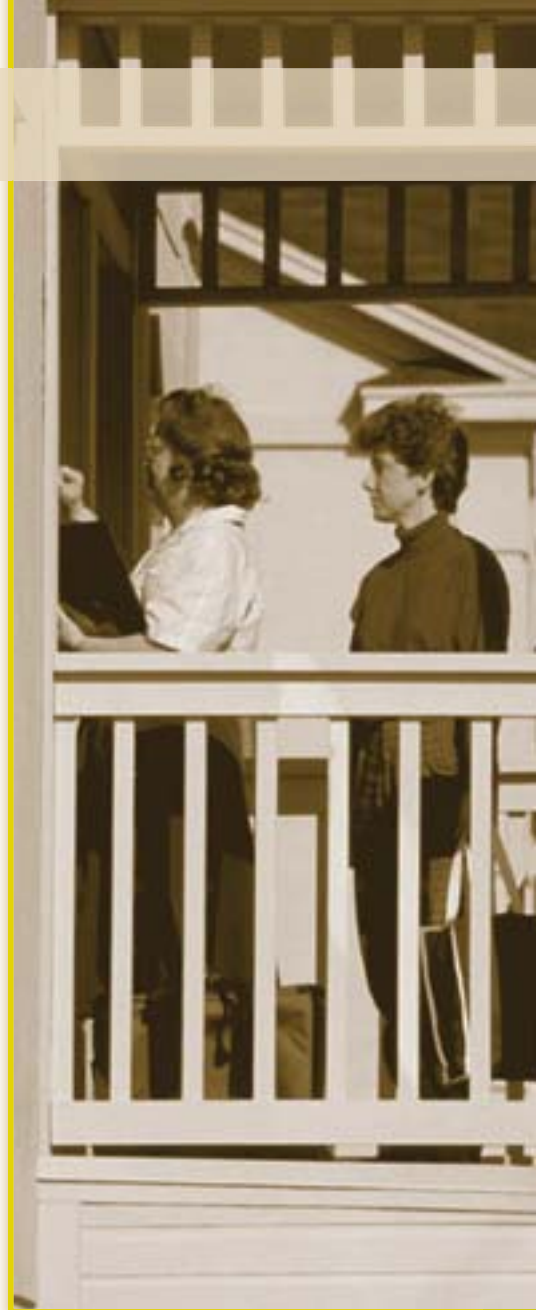
Applying Science to Assess Food Safety Risks

During FY2008, we began working with the U.S. Food and Drug Administration (FDA) to develop approaches to prevent illness caused by contamination of fresh produce and/or shellfish by microbial or chemical agents.

A critical component of this research is the development of models, methods, and databases that FDA can rely on to rank food-related threats to public health, identify research priorities, and select optimal strategies to reduce health risks associated with consuming fresh produce and shellfish.



Rochelle Tyl examines tissue samples from rodents exposed to bisphenol A (BPA). She conducted the largest and most comprehensive study on potential health risks of oral dietary exposure to BPA and found no adverse health effects from low-dose exposure in rats and mice.



Milestones in Public Health and Policy

- 1958 RTI’s first project is an analysis of morbidity data from Tennessee.
- 1988 RTI undertakes the National Survey on Drug Use and Health project, the major source of data on substance use and abuse for policy makers.
- 1997 RTI teams with UNC-Chapel Hill to become one of the Agency for Healthcare Research and Quality’s evidence-based practice centers.
- 2005 RTI studies how media campaigns and government policies influence tobacco use.

“Recent disease outbreaks associated with contamination of green onions, lettuce, spinach, and tomatoes underscore the significant challenges facing the FDA,” said Steve Beaulieu, RTI’s program manager for the project. “Controlling contamination of these products requires the FDA to rigorously evaluate the food supply system, beginning at the farm.”

In response to these needs, RTI researchers are developing a quantitative predictive risk assessment model that simulates the probability of pathogen contamination of fresh produce and subsequent illness.

The model is designed to characterize baseline risks and estimate potential reductions in risk that may be achieved through proposed interventions to prevent, reduce, or eliminate pathogen contamination at critical points along the food supply chain.

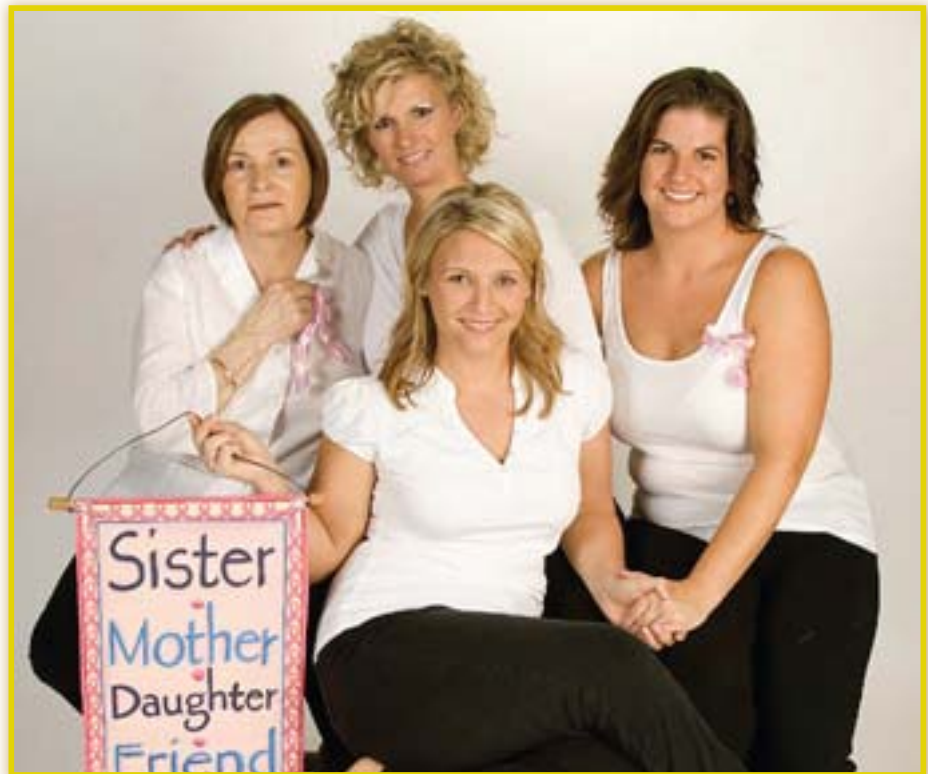
As part of this project, RTI is working closely with Lee-Ann Jaykus, PhD, who is on sabbatical from North Carolina State University.

Health Economics and Health Behaviors

Calculating Chronic Diseases

Chronic diseases are a leading source of mortality and morbidity in the United States. During FY2008, our researchers worked with CDC to quantify the economic burden of chronic diseases on Medicaid.

We conducted the first Medicaid-specific, state-level estimates of expenditures attributable to six chronic diseases—hypertension, heart disease, stroke, congestive heart failure, diabetes, and cancer—and found that, when adjusted to 2007 dollars, annual Medicaid expenditures for these six chronic diseases totaled \$43.6 billion



During FY2008, researchers at RTI International began developing, implementing, and evaluating four computer-based decision support tools that will help clinicians and patients better use genetic tests to evaluate and treat breast cancer.

nationwide, approximately 15 percent of total Medicaid expenditures.

“These findings highlight the significant burden that these diseases impose on state Medicaid programs and costs that could be averted through public health strategies to prevent and effectively treat these diseases,” said Susan Haber, ScD, a health policy researcher at RTI and the project’s leader.

We found hypertension to be the most prevalent of the six chronic diseases, accounting for \$16.2 billion in Medicaid expenditures and affecting 13.5 percent of Medicaid beneficiaries nationwide. State-level prevalence ranged from 7.6 to 18.8 percent.

Nationally, 6.8 percent of Medicaid beneficiaries had diabetes, and state-level prevalence ranged from 4.5 to 9.9 percent. The prevalence of heart disease varied from 4.2 to 9.5 percent

across states, while cancer, stroke, and congestive heart failure each had an overall state-level prevalence of less than 3 percent. We also developed the Chronic Disease Cost Calculator, a downloadable tool that provides state estimates of Medicaid spending for the six chronic diseases.

Next year the project will be extended to include costs to Medicare, private payers, and all payers to better understand the economic impact of chronic diseases.

Developing Tools to Help Evaluate and Treat Breast Cancer Patients

During FY2008, as part of a new federal project funded by the U.S. Department of Health and Human Services’ Agency for Healthcare Research and Quality, we began developing, implementing, and evaluating four computer-based decision support tools that will help

clinicians and patients better use genetic tests to evaluate and treat breast cancer.

The tools will help women accurately understand their genetic information and its impact on their treatment options.

If effective, these tools could change the clinical practices of both primary care physicians and oncologists.

The first pair of tools will assess whether a woman with a family history of cancer should be tested for BRCA1 and BRCA2 gene mutations. Knowing whether she has inherited these gene mutations may help her and her physician determine her chances of developing certain kinds of cancer, especially breast cancer.

The second pair of tools, for women already diagnosed with breast cancer, will help determine which patients are appropriate for a gene expression profiling (GEP) test. GEP test results can help physicians evaluate

which patients are at a high risk of cancer recurrence and therefore are good candidates for supplemental chemotherapy.

“Our goal is to develop tools that are accurate, usable, and easily integrated into clinical workflow,” said Linda Squiers, PhD, a senior health communication analyst at RTI and the project’s manager. “If effective, these tools could change the clinical practices of both primary care physicians and oncologists.”

Enhancing Military Mental Health

We also continued our 25 years of experience conducting studies to improve military health.

We began a project designed to better help soldiers cope with the transition to civilian life and found that 55 percent of Marines and 40 percent of Navy personnel who were transitioning to civilian life had high rates of symptoms of mental health distress. Our research also showed that almost half of the Marines and 31 percent of Sailors surveyed suffered from symptoms of depression.

“These findings indicate that many military personnel either experience or report mental health problems before they are discharged,” said Laurel Hourani, PhD, a research epidemiologist at RTI and the study’s lead author. “This suggests that the transition process itself may be contributing to the development and/or exacerbation of mental health symptoms.”

This research provides the military’s Combat Stress Control programs with the information they need to better help active-duty personnel, reservists, and veterans.

Our researchers surveyed 3,700 Marines and Sailors who attended mandatory transition assistance courses. The results



RTI’s research suggests that a high percentage of military personnel report mental health distress during their transition to civilian life and that the military should be alert to psychological needs of soldiers during that time.

Milestones in Health Economics and Behaviors

- 1976 RTI begins a 5-year National Medical Care Expenditures study to analyze the costs and use of medical services by U.S. citizens.
- 1987 RTI studies substance abuse and family life issues affecting military job retention for the Defense Department.
- 2002 RTI studies the effectiveness of the American Legacy Foundation’s youth smoking-prevention campaign.
- 2003 Working with CDC, RTI researchers provide the first state-by-state estimates of the share of medical expenditures—as much as \$93 billion a year—that are related to obesity.

suggest that providers of transitional services offered by the military should be more alert to the psychological needs of those transitioning to civilian life.

We found that social support was the strongest component of resilience and thus is an important area for the military to consider in developing further intervention programs to help transitioning personnel. Marines and Sailors who had a higher than average perception of their health, problem-oriented coping strategies, and higher levels of spirituality also exhibited higher levels of mental health resilience.

Next year, we will follow up with the participants in the study to determine how their physical and mental health status has changed since they were discharged from the service and to identify risk factors and protective factors, such as social and occupational support, for post-discharge resilience.

Global Health

Increasing Access to HIV/AIDS Counseling, Testing, Care, and Treatment

A major hurdle for treating people with HIV/AIDS in sub-Saharan Africa has been the lack of services accessible to the rural population. Since 2004, as part of a five-year project, RTI researchers have been changing that, increasing access to HIV counseling, testing, care, and treatment in rural Ugandan clinical settings.

“We are working to train health workers in 38 health facilities in 13 districts across the country to provide quality health care counseling, testing, care, and treatment services for HIV-positive people,” said Robert Ssengonzi, PhD, a senior research health specialist at RTI and the project’s manager.

HIV counseling and testing is now offered routinely to all patients who seek services at the supported health care facilities. Patients who are found to be HIV positive are provided with additional basic and specialized care and treatment services.

Since March 2005, when the program began, more than 2,000 health workers have been trained to provide the testing, counseling, and treatment services that have been utilized by more than 200,000 people.

Of these, 20,000 were found to be HIV positive and thus received septrin prophylactic treatment, which provides relief and prolongs the life of HIV patients. They were also referred to chronic care clinics—some of which were established by this program—for additional basic and/or comprehensive HIV/AIDS-related care and treatment.

During the next year, RTI will continue to support 41 health care facilities in providing an estimated 300,000 individuals with HIV-related services.

Expanding Global Health Capabilities

As part of our efforts to improve the reproductive health of vulnerable women around the globe, during FY2008 RTI hired an internationally recognized team of researchers from the University of California, San Francisco.

Led by Nancy Padian, PhD, the Women’s Global Health Imperative (WGHI) is now a focus area within RTI. The WGHI conducts a wide range of research on topics including HIV/AIDS and other sexually transmitted diseases, reproductive health, gender and economic inequities, contraceptive technologies, and community-based interventions among vulnerable populations in low-resource settings.

“The Women’s Global Health Imperative will play a key role as we expand our global health research program,” said RTI President and CEO Victoria Franchetti Haynes, PhD. “Together they bring a tremendous amount of energy, talent, and experience to RTI in the area of HIV/AIDS and women’s health.”



In rural Uganda, a health worker takes a blood sample from a patient. Since 2004, RTI has been increasing Ugandans’ access to HIV counseling, testing, care, and treatment in 38 health facilities in 13 districts across the country.



Many children in rural areas of Nepal do not receive necessary health care. RTI staff members are working to strengthen the county's public health services so that access to care is improved and expanded to the underserved populations.

These researchers are currently conducting research in the United States, India, and southern Africa. They are studying the effects of poverty and marital violence on a woman's susceptibility to HIV and other sexually transmitted infections (STIs), the effectiveness and acceptability of women-controlled methods for disease prevention, and the impact of improved educational and economic opportunities on young women's vulnerability to STIs.

In southern Africa, WGHI is developing programs to empower young girls to avoid risky sexual behaviors by improving their economic opportunities—through vocational training, guidance counseling, and micro-grants, for example—and linking them to life skills-based HIV education and clinical care.

The WGHI program complements ongoing work at RTI that uses a women's empowerment approach to address HIV/AIDS prevention and treatment in South Africa, and our work on the use of microbicides as a prevention strategy.

In the United States, RTI researchers are also examining the relationships between immigration and reproductive health and between gang membership and pregnancy risk. In India, we are training primary health care providers to understand gender-based violence as a health issue.

Reforming Health Care in Nepal

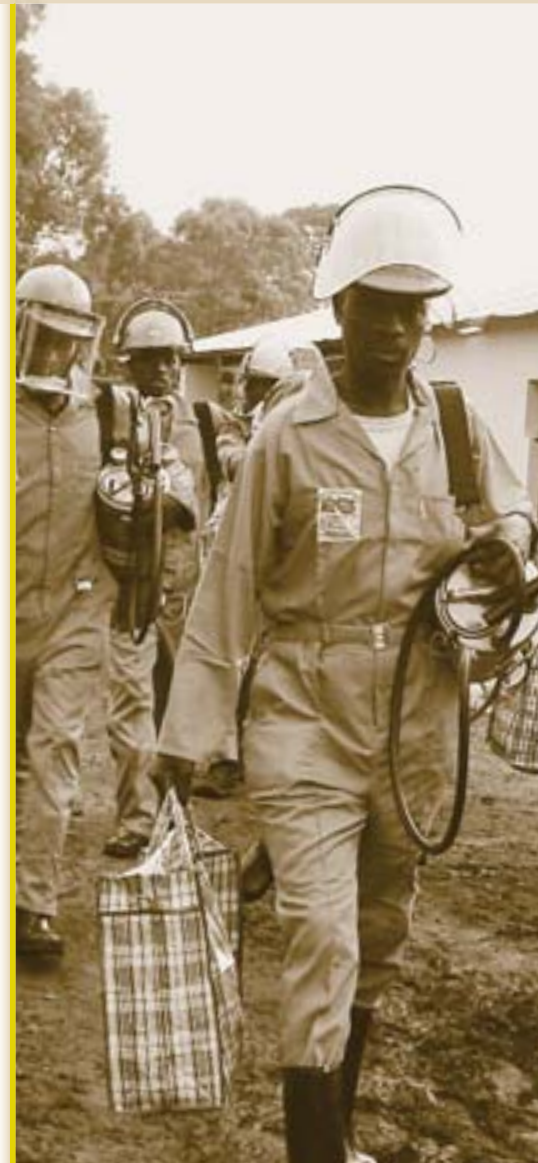
During FY2008, we continued to provide policy and strategy support to Nepal's Ministry of Health and Population as the Ministry reforms the country's health care system under a new government.

The program is working to strengthen public health functions so that access to essential health care services can be improved and expanded to underserved populations across the country. The program is also developing resources for safe motherhood and other services.

Eighty-five percent of the population of Nepal lives in rural areas, about three hours from the nearest road, making health care providers' access to them extremely difficult.

The project works with the Ministry of Health and Population to address its systematic problems, policy issues, and delivery of services. We design strategies to involve stakeholders—such as local governments or civil society organizations—both to improve the supply of health care services and to promote the demand for such services from those who so far have been excluded.

“This project will make a large impact on the most underserved segments of Nepalese society—particularly women, children, the poor, and disadvantaged—who face many challenges in receiving quality health services,” said RTI project manager Dennis Chao, PhD.



Milestones in Global Health

- 1976 RTI helps the government of Morocco plan and implement measures for curbing malnutrition.
- 1987 RTI manages data collection for more than 80 clinical studies of pulmonary complications experienced by people infected with HIV.
- 2003 RTI's Pretoria, South Africa, office begins a 5-year study to improve women-focused intervention programs for HIV prevention.
- 2006 RTI begins supporting direct interventions for malaria control in Angola as lead implementer for the U.S. President's Malaria Initiative.

Epidemiology and Special Populations

Meeting Children's Health Care Needs

Our researchers worked with researchers at the University of Illinois to conduct a study that found that half of the children in the nation's child welfare system have a history of special health care needs.

The study, published in *Pediatrics*, found that during a three-year period, half of the children involved in the child welfare system had special health care needs that included chronic health conditions, such as asthma, as well as behavioral, emotional, and developmental problems.

“Our results underscore the need for cross-system service collaboration between health, mental health, and social service providers to better meet children's needs,” said Heather Ringeisen, PhD, director of the children and families research program in RTI's survey research division and the study's lead author. “Inattention to these special health care needs may not only compound the immediate effects of abuse and neglect, but also may increase the risk of future long-term impairment for these children.”

The study used data from the National Survey of Child and Adolescent Well-Being, conducted by RTI. Over the course of five to seven years, researchers followed approximately 5,500 children who ranged in age from birth to 15 years old and were reported for child maltreatment in 1999.

The study examined child outcomes for three years beyond the maltreatment investigation. The researchers found that boys, children over the age of 2, and children living in poverty were all more likely than their counterparts to have special health care needs. Adopted children and children living in foster



Researchers at RTI and the University of Illinois conducted a study that found that half of the children in the nation's child welfare system have a history of health care needs that include behavioral, emotional, and developmental problems, as well as chronic health conditions such as asthma.

care were also more likely to have a history of special health care needs than children with no experience with out-of-home placement.

The results showed that during that three-year period, 21 percent of children in the child welfare system had a history of learning disabilities, 14 percent exhibited emotional disturbances, and 12 percent had speech impairment. These rates of incidence are all significantly higher than those of children not in the child welfare system.

Nearly half of the children with special health care needs also had behavioral and developmental problems.

Creating Assessment Tool for Low-Birth Weight Babies

For years, parents of extremely premature babies and the doctors who advise them have relied primarily on the baby's estimated gestational age to determine whether the child receives intensive medical treatment to save its life vs. comfort care, if the child is not expected to survive.

But a study published in the April 17 *New England Journal of Medicine*

provided new insights and a new assessment tool to help parents and doctors decide on an appropriate course of treatment based on the child's estimated probability of survival and disability.

I think those of us involved in this research would agree that it is one of the most important studies any of us has ever been involved with.

“I think those of us involved in this research would agree that it is one of the most important studies any of us has ever been involved with,” said John Langer of RTI, who with co-authors developed and validated the model used to predict survival and disability. “Parents and their doctors will have the best available information on which to base one of the most difficult and time-sensitive decisions they are ever likely to face.”

In a statistical analysis of those infants' outcomes, researchers found that in addition to estimated gestational age,

four key criteria influence the likelihood of a child's survival and potential long-term disability: the infant's sex, birth weight, whether the infant is part of a multiple birth, and whether the mother was given corticosteroids to promote infant lung development.

Until now, physicians and family members deciding the kind of care to provide relied heavily on an infant's gestational age—the week of pregnancy during which a premature infant is born—which is known to greatly affect the infant's survival. In some facilities, intensive care is likely to be given routinely to most infants born after the 25th week of pregnancy, whereas infants born before the 22nd week may be more likely to receive comfort care.

Complicating the parents' decision, the authors noted, is that gestational age is extremely difficult to estimate accurately. A preterm infant may be as much as a week or two younger, or older, than believed.

Based on this research, a tool is now available on the Web site of the Eunice Kennedy Shriver National Institute of Child Health and Human Development that parents can use to receive estimates of survival based on the four factors identified as important in predicting survival.

Improving Provision of Dental Services to Native Alaskans

As part of an effort to improve the health of people in isolated communities, during FY2008 we began evaluating a model oral health program serving isolated Native Americans in rural Alaskan communities.

The two-year, \$1.6 million study is evaluating the implementation of the Dental Health Aide Therapist Program in communities that employ it, assessing the program's integrity to the overall program model, identifying barriers and facilitators for longer-term success, and examining the costs and cost-effectiveness of the program.

"Among other things, we are looking at patient access to care and the level of patient satisfaction with the dental therapists," said Scott Wetterhall, MD, MPH, senior program director of health security and systems research at RTI and the project's director. "We'll also look at the quality of diagnosis and treatment, the development of community-based prevention programs, and the general practice procedures used by the therapists."

The program trains mid-level service providers who live and work in the rural communities to provide prevention services and perform fillings, extractions, and other limited dental services.

According to the 1999 Indian Health Service Survey, the Alaskan Native population has a high rate of oral disease. Children ages 2 to 5 have almost five times the amount of tooth



Milestones in Epidemiology and Special Populations

- 1971 National Institute on Drug Abuse (NIDA) awards a grant to RTI to study the relationship between substance abuse and criminal arrests.
- 1988 RTI releases the National Vietnam Veterans Readjustment Study, assessing post-traumatic stress disorder.
- 1990 RTI leads the consortium that developed the Health Care Financing Administration's minimum data set for nursing homes to help staff gather information on residents' health.
- 1998 RTI conducts the first National Survey of Child and Adolescent Well-Being.
- 2006 RTI researchers publish a paper in *Nature* reporting on the best strategies for responding to a possible avian flu pandemic.



Scott Wetterhall (front) and collaborators on the project are evaluating a model oral health program that is delivering dental health to isolated Native Americans in rural Alaskan communities.

decay as do children of similar ages in other parts of the United States. Children ages 6 to 14 have 4.5 times the amount of tooth decay, and adult periodontal disease is 2.5 times higher than in the general population.

The Kellogg Foundation, together with the Rasmuson Foundation and the Bethel Community Service Foundation, funds the Dental Health Aide Therapist training program through the Alaska Native Tribal Health Consortium. The Alaska Native Tribal Health Consortium is working with the University of Washington to train approximately 24 dental health aid therapists from Alaska over a four-year period. Once trained, these therapists will work under the supervision of dentists who oversee the services in villages throughout the state.

Genetics, Proteomics, and Bioinformatics

Understanding Fragile X Syndrome

RTI has conducted some of the largest studies on fragile X syndrome, the most common inherited cause of intellectual disability.

Several studies conducted during FY2008 looked specifically at carriers of fragile X syndrome, people who have an altered gene that increases their risk of having children with the disease but who themselves do not generally show signs of the disease.

The new studies, conducted by investigators at RTI and the University of North Carolina at Chapel Hill and published in the *American Journal of Medical Genetics*, show that carriers, both women and men, may be at risk in a variety of areas.

“Collectively, these studies provide new insights into what it means to be a carrier of fragile X syndrome,” said Don Bailey, PhD, a Distinguished Fellow

at RTI and director of the projects that produced these findings. “These studies suggest the possibility that carriers of fragile X may also have a higher biological susceptibility to things like depression, attention problems, or stress.”

Collectively, these studies provide new insights into what it means to be a carrier of fragile X syndrome.

After surveying more than 1,000 parents of children with fragile X, we found that boys who carry the gene were more likely to have been diagnosed or treated for developmental delay, attention problems, aggression, seizures, autism, and anxiety than children of parents who did not carry the gene. Girls who carry the gene were more likely to have been diagnosed or treated for attention problems, anxiety, depression, and developmental delay.

The findings have important implications for professionals working with families of children with fragile X. “Typically services are directed toward children who have fragile X syndrome, not carriers,” Bailey said. “Carriers may also be in need of support.”

During FY2009, RTI and UNC will begin a collaborative newborn screening study to identify, at birth, children who have fragile X syndrome as well as carriers so that carrier children could receive early treatment for any co-occurring conditions.

Harnessing Research Computing Technologies to Improve Health

By harnessing our research computing technologies, we are continuing to improve the science and research involved in better understanding public health.

During FY2008, we began a collaboration to engage researchers around the country in establishing a standard set of core measures for



During FY2009, researchers at RTI and the University of North Carolina at Chapel Hill will begin a study to identify, at birth, children who have fragile X syndrome, the most common inherited cause of intellectual disability. During FY2008, those researchers found that carriers of fragile X may also be at risk for developmental or behavioral problems.

PhenX Toolkit

Welcome to the PhenX Toolkit

Use the Toolkit to browse, review and select measures for use in genome-wide association studies (GWAS) or other types of studies. The measures were selected by PhenX Working Groups (PWG) composed of domain experts. For each measure, the Toolkit has associated protocol(s), references and links to resources. Use of PhenX measures will ensure that your study will be compatible with other studies that also incorporate PhenX measures. For additional information about PhenX and PhenX measures, please visit www.phenx.org.

After you have selected the measures you want to incorporate in your study, you will have the opportunity to generate a custom report that will provide the information you need to effectively use the PhenX Measures.

Release Notes

This is prototype version 2 of the PhenX Toolkit, September, 2008. This preview of the toolkit is designed to foster discussion about the requirements for the toolkit and to showcase some design ideas. This preview contains preliminary measures selected by the Demographics and Anthropometrics Working Groups.

Domain

A domain is a field of research with a unifying theme and easily enumerated quantitative and qualitative measures. Examples of domains that have been identified by the PhenX Steering Committee include demographics, anthropometrics, organ systems, complex diseases and lifestyle factors.

Element

A domain element categorizes a group of measures and conditions that endorse similar assessments and concepts. Examples of domain elements include race and ethnicity in the demographics domain.

Registration

You may browse the PhenX Toolkit site, but to enjoy the full set of the features, you need to register.

Links

These external links will navigate away from the PhenX Toolkit:

dGAP | PhenX

RTI introduced the PhenX Toolkit during FY2008. PhenX is a Web-based application that will provide the scientific community with a standard set of core measures for large-scale genomics research efforts to enable cross-study comparison and analysis.

genome-wide association studies and other large-scale genomics research efforts.

Standard measures will maximize benefits of future research by enabling cross-study comparisons and analysis.

The strength of population-based genomics studies depend on the number of participants. Thus, the ability to combine the results of small, complementary studies will make it possible to gather additional information and to gain a better understanding of how genetics and the environment affect health and disease.

Over the course of the three-year project, called PhenX (pronounced “phoenix”) for phenotypes and exposures, experts from across the scientific community will recommend up to 15 measures on which to collect data for each of up to 20 research areas such as demographics, anthropometrics,

cardiovascular, cancer, and exposures. These consensus measures will be made readily available to the research community via the Web-based PhenX Toolkit.

In addition to developing this new resource, we also used our expertise to continue our support of an existing one, the National Institute of Diabetes and Digestive and Kidney Diseases’ Central Data Repository, one of three central repositories.

The repository is a powerful tool for performing in-depth secondary analysis of previously collected data. It will be an important tool for increasing the reach of studies of diabetes, and ultimately it will enable researchers to conduct entirely new studies without having to collect data, thus minimizing biologic sample collection.

To assist current studies, RTI researchers are preparing data for archiving, coordinating cross-referencing between the three repositories, and maintaining the Central Repositories Web site, from which researchers can order trial results via a Web catalog. We will continue improving the database and incorporating applications that permit external users to browse the database and determine if sufficient data quantity and quality are available in the repository to examine their specific hypotheses.

The Central Data Repository is used to catalogue, retrieve, and check the integrity of study data, manage data requests, and answer researchers’ questions. It currently houses publicly available data and samples from 17 studies and data samples being collected from more than 40 additional ongoing studies.

Milestones in Genetics, Proteomics, and Bioinformatics

- 2001** RTI launches its Partnerships for Genomics and Molecular Epidemiology to expand the frontiers of genetics research.
- 2004** NIH selects RTI to research associations between human genomic and proteomic assessments and outcomes of vaccination for pathogens of primary interest for biodefense.
- 2006** In the journal *Nature*, RTI outlines the best strategy for responding to an avian flu pandemic, developed as part of our work as the core informatics group for the Models for Infectious Disease Agent Study (MIDAS).
- 2006** RTI develops a novel method for shotgun proteomics, which enables the simultaneous analysis of thousands of proteins in complex biological fluids.
- 2007** To further genome-wide association research, RTI begins developing consensus priority measurement protocols to be included in research studies.

Drug Discovery and Development



One Step Closer for Potential Cocaine Addiction Therapy

July 2008 marked an institute first and a key milestone in the development of a novel compound that could one day be used to treat cocaine addiction and relapse. In a cooperative agreement with the National Institute on Drug Abuse, RTI filed an Investigational New Drug (IND) application for phase 1 clinical studies of RTI-336.

Accepted by the U.S. Food and Drug Administration, the application outlines our clinical plan and protocols for “A Double-Blind, Placebo-Controlled Study to Evaluate the Safety, Tolerability, and Pharmacokinetics of Single, Escalating Oral Doses of RTI-336 in Healthy Male Subjects.” Under the clinical trial, which takes place in fall 2008, researchers will study the safety and pharmacokinetics to determine how the drug behaves in the body.

Drug discovery and development is one of RTI’s core research activities. Experts across RTI work with biopharmaceutical companies and government agencies to bring new medicines to market and to ensure the safety and efficacy of those in the marketplace.

This year, our efforts include getting a potential cocaine addiction therapy into phase 1 clinical trials, launching unique metabolic profiling assays, and providing valuable services in support of clinical development and post-approval of new drugs and devices.

Data from these trials will guide additional safety trials as well as efficacy trials to determine if RTI-336 is suitable as a pharmacotherapy for cocaine abuse.

If proven to be safe and efficacious and to have minimal abuse potential, RTI-336 could one day help the estimated 1 million cocaine users in the U.S. who seek treatment for their dependence each year by minimizing their cravings.

Drug Development and Commercialization

RTI performs customized studies and novel methods in support of all phases of development—from preclinical testing and analysis of very early-phase compounds through manufacturing of approved drugs and devices and conduct of post-approval studies. In FY2008, we helped approximately 100 commercial clients develop and commercialize a wide range of new therapies.

Trace and Ultratrace Elemental Analysis and Speciation

RTI is home to a team of chemists who specialize in the measurement of trace metals and other elements at trace- and ultratrace-level concentrations. We develop and apply analytical methods to identify process contaminants and measure metals in biological fluids during preclinical and clinical trial phases.

For one pharmaceutical client, 2008 marked 10 years of continuous support. On behalf of this company, we have conducted ultra-trace measurements in support of more than 25 clinical safety and pharmacokinetic studies of a new drug.

Safety and Efficacy Studies

RTI performs the bioanalytical, toxicology, and drug metabolism and pharmacokinetic studies required to help determine whether a drug is safe and effective. This year, our drug safety and efficacy studies supported new drugs to treat depression, memory disorders, and Alzheimer’s disease. Other projects focused on treatments for eye disease and the emerging area of regenerative medicine.

This year, our drug safety and efficacy studies supported new drugs to treat depression, memory disorders, and Alzheimer’s disease.

Also this year, RTI launched unique new assays for investigating drug metabolism processes in collaboration with a leading researcher at Duke University. Using an exclusive method for assessing some 180 metabolic markers, we screen compounds that treat obesity and other therapeutic indications, enabling the evaluation of subtle effects that may predict weight loss, weight gain, and fuel selection.

Ultrastructure Analyses

RTI experts in microanalytical sciences provide health sciences clients with critical information about the detailed structure—or ultrastructure—of drugs and devices. We quantify all structural aspects of drug products and characterize their properties, and we identify and help eliminate contaminants from parenteral pharmaceuticals, biomedical devices, and medical products.

For example, in FY2008 we examined blood vessel stents, corneal implants, and other artificial implants before and after placement in a subject to determine whether they sustained undesirable reactions to the actual conditions in the body.



Research environmental scientist Owen Crankshaw studies the morphology of drug products and biomedical devices, which is often important for proper delivery into the human system.

Clinical Development and Post-Launch Services

Through our separate business unit, RTI Health Solutions (RTI-HS), we provide services to help biopharmaceutical and medical device clients develop and commercialize their products.

Launched in 2000, today RTI-HS is home to experts who supported the product development programs of over 50 client companies in FY2008.

We collaborate with clients to design and implement safety programs that comply with regulatory guidelines. We investigate disease epidemiology, drug effects, and usage under real-life conditions and design and evaluate effective risk management strategies.

We also help demonstrate the global economic value and impact of pharmaceutical products in the context of health outcomes. We develop outcomes research plans and regulatory strategies to maximize product value in the marketplace and assess disease and treatment outcomes from the perspective of patients, caregivers, and health care professionals. We help our clients develop reimbursement strategies to gain formulary access for their products.

RTI-HS experts also conduct studies to quantify the effects of health care interventions and outcomes on the satisfaction, utility, and behavior of patients, physicians and other decision-makers, using conjoint analysis and stated-preference studies. We conduct rigorous statistical analyses and provide help with protocol design, medical monitoring, data analysis, and clinical endpoint selection.

RTI-HS routinely collaborates with clients to present study results at professional meetings and publish studies in peer-reviewed journals. This can help patients, physicians, regulators, and other stakeholders make better health care decisions. This year, we presented at numerous conferences and authored or co-authored over 80 papers that were published or accepted for publication in scientific journals.



Milestones in Drug Discovery and Development

- 1965 RTI researchers isolate camptothecin.
- 1971 RTI reports the isolation of taxol from the Pacific yew tree and notes its potential as a cancer-fighting compound.
- 1989 RTI's research to understand the biomedical mechanisms involved in cocaine addiction culminates in the development of RTI-55 (now Dopascan), used to diagnose patients with Parkinson's disease, and RTI-336 and JD_{Tic}, to prevent drug relapses.
- 2000 RTI forms a new business unit, RTI Health Solutions, to provide research and consulting services to biopharmaceutical and medical device companies.

International Development



In FY2008, RTI's work in institutional development and capacity building took us to 60 countries on four continents. Highlights from the year exemplify the advisory and training services we deliver to all levels of government and showcase our ability to bring together local stakeholders and implement programs that are truly sustainable. Also this year, guidelines published by one of our foremost experts in post-conflict reconstruction were employed to help children displaced by violence in Kenya.

open institutions, citizen participation, and increased transparency.

“DRSP collaborates with local implementing agencies and civil society organizations to promote government accountability and transparency, and citizen involvement,” said Gordon West, RTI's chief of party for the project. “We support local initiatives to increase accountability within national election systems, safeguard media freedoms, improve the quality of and public participation in the legislative process, and foster openness in the court system.”

For example, together with the Indonesian Research and Development Institute and civil society organization Yayasan SET, RTI is working with citizens and key government ministries to inform the public and begin implementation of the landmark Freedom of Information law passed in April 2008. DRSP support for the national parliament has focused on reforms in personnel, budgetary, and legislative systems that will improve both performance and transparency of the legislative branch.

Other efforts include working with local organizations to support improved systems and openness of the Constitutional Court, to establish new systems of accountability for political party and campaign finance reforms, and to refine the national legislative and regulatory framework for regional governance.

We support local initiatives to increase accountability within national election systems, safeguard media freedoms, improve the quality of and public participation in the legislative process, and foster openness in the court system.

Supporting Indonesia's Transition to Democracy

Since 1998, Indonesia has made great strides in its transition to democracy. Fundamental constitutional reforms include direct election of the president, vice president, and provincial governors, as well as creation of a constitutional court and a legislative chamber that represents the interests of the provinces.

RTI is implementing two programs funded by the United States Agency for International Development (USAID) to support this transition.

Aiding Democratic Reforms

Through the Democratic Reform Support Program (DRSP), RTI is assisting Indonesia in its commitment to create a stable democracy through

Strengthening Local Governance

Under USAID's Local Governance Support Program (LGSP), RTI is helping city and district governments strengthen their legislative processes, engage citizens in planning and strategic decision-making, and improve their systems for planning and budgeting for the delivery of services.

Operating in more than 60 districts and cities in nine provinces, LGSP is an integrated set of assistance activities designed to support both sides of the good governance equation. First, it supports local governments in becoming more democratic, more competent at the core task of governance, and better able to improve service delivery and manage resources. Second, it aims to strengthen the capacity of local legislatures and civil society organizations to perform their roles and involve citizen participation in decision making.

Now in its fourth year, LGSP has fostered greater inclusion of citizens in local-level government planning and increased transparency in budgeting through, for example, public hearings and publication of regional budgets. With LGSP support, 12 local councils have passed or are preparing regulations for transparency and citizen participation. A majority of LGSP partner governments have adopted performance-based budgets, and more than 150 local citizens' organization are now monitoring and reporting on budget and service delivery issues.

In the challenging regions of Aceh and West Papua, RTI is supporting citizens and government in overcoming decades of conflict, regional imbalances, and distrust. We are also collaborating with the Government of Indonesia to ensure that decentralization policies are properly drafted and implemented,

including 2008 guidelines for participatory planning and public service contracting.

Also in 2008, RTI documented the good practices and experience gained and finalized a wide range of training materials and technical publications during the year: 30 titles have now been published, of which 20 were produced during 2008.

“In short,” said Judith Edstrom, RTI’s Chief of Party for the project, “doors once closed are opening, partnerships are being built, public services are improving, and democracy beyond the election booth is gaining traction.”

Communities Tackle Crime and Violence in El Salvador

Criminal gangs have attracted thousands of young Salvadorans who have poor economic prospects, and



In February 2008, LGSP assisted the Indonesian Women’s Political Caucus in Mojokerto, East Java, in holding independent training for members seeking to become planning forum facilitators. RTI operates the project in more than 60 districts and cities across nine provinces.

Milestones in International Development

- 1961 RTI’s first international project helps the Nigerian government develop an agricultural census.
- 1978 Under our first USAID project, RTI begins helping Tamale, Ghana, implement plans for better health care services, water system, and other infrastructure needs.
- 1990 RTI begins working with Indonesia on a USAID-funded program to create a foundation for decentralized democratic local governance.
- 2003 RTI begins a project for USAID to assist in developing effective, democratically elected local governments throughout post-conflict Iraq.



With support from RTI and the Center for International Studies and Cooperation, a local group organized a civic parade to promote nonviolence in a high-risk neighborhood in Tonacatepeque, El Salvador. Some 500 students, community leaders, public officials, and others took part in the May 2008 event.

the gangs continue to grow, posing new threats to community stability, democracy, and good governance.

To overcome the human and economic losses of gang-based and other violence and crime, RTI is implementing a two-year crime and violence prevention project, with funding from USAID. Building on 10 years of local government programs in El Salvador, we will use our proven participatory strategic planning approach to facilitate involvement of private-sector and local entities.

“Currently the national government does crime prevention through a top-down approach and rarely includes local governments and the private sector,” said Aldo Miranda, RTI’s Chief of Party for the project.

RTI will collaborate with the Center for International Studies and Cooperation, a Canada-based organization, to build the capacity of the Salvadoran government, municipalities, and civil society to track and analyze patterns of crime and violence. We will then help design, implement, and monitor prevention initiatives, such as vocational training for youth, after-school programs, domestic violence counseling through schools and churches, and revitalization of parks and other public spaces.

RTI is working with 10 communities in four of El Salvador’s most violent municipalities and will then disseminate best practices throughout the country and region.

An early focus will be to understand the patterns of local crime by training officials from the municipality of Santa Tecla to use geographical information systems (GIS) for mapping crime. These data will help a working group—formed by community members, national government officials, and civilian police—plan and carry out prevention programs.

The project is also helping finance these programs through a small grants program and through private-sector funding. For example, Shell Oil has independently awarded RTI a contract to monitor and evaluate an after-school crime prevention program conducted by Junior Achievement of El Salvador. The program is helping nearly 3,000 youth in San Salvador avoid the allure of gang activity by teaching them entrepreneurship to generate their own incomes.

RTI is working with 10 communities in four of El Salvador’s most violent municipalities and will then disseminate best practices throughout the country and region.

At the same time, the RTI project team is working with the National Council for Public Safety and the Ministry of Public Security and Justice to develop a national crime prevention policy that emphasizes sharing data across institutions to track the evolution of crime and violence and prevention efforts in El Salvador.

RTI Report Informs Post-Conflict Reconstruction in Kenya

In one of the year's most compelling examples of how our research improves the human condition, the Dutch development organization SNV, which was working in Kenya following violence that erupted after the presidential election earlier this year, drew upon a study by RTI Distinguished Fellow Derick Brinkerhoff, EdD, on sustainable post-conflict reconstruction.

SNV used Brinkerhoff's guidelines, published in a *Capacity.org* article titled "Capacity Development in Fragile States: Dilemmas and Directions," to design a locally led emergency

response program for education, funded by UNICEF, in the Rift Valley area of Kenya, where some of the worst violence erupted.

Applying the guidelines and other resources provided by Brinkerhoff, SNV's development expert Harm Duiker was, within two weeks, able to use local education resources to meet the basic educational needs of children displaced by the violence. As a result, thousands of children could continue education with support from the development assistance community, with the district education offices in the lead. While SNV continues to scale up its program to other districts, the short-term results were assessed as very favorable.



Harm Duiker SNV (Netherlands Development Organization)

Following guidelines developed by RTI's Derick Brinkerhoff, an expert in international development, a Dutch organization was able to mobilize local resources to meet the educational needs of children displaced by violence in Kenya's Rift Valley.

A gateway for capacity development

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Fragile states

Capacity development in fragile states

Dilemmas and directions

How can donors and their partners support sustainable capacity development in fragile states? This article addresses key issues and dilemmas that members of the international community confront in answering this question.

Derick Brinkerhoff
Distinguished Fellow
Center for a World of Public Management,
RTI International, at
Lehigh University, Lehigh University, School
of Public Policy and Public Administration, VPA

Capacity development in fragile states

The capacity of the state and the partners to provide health services for the population is affected by the resources they receive from the national government and international donors, by the policies governing how service provision is financed and managed, by the degree of corruption, by the health of service providers and their work, and so on.

Fragile states and capacity development

Most of what is considered desirable for effective capacity development in general applies to fragile states as well. The dilemmas are often a matter of degree. For example, an external foreign policy objective always influences their choice of economic, administrative and financial factors. In the case of fragile states, these factors intensify the donor policies. First, fragile states require other international commitments beyond the development assistance community. Second, the high volatility of some fragile states, especially in Afghanistan, gives a media spotlight an intervention effect.

In Afghanistan, for example, the decision to only fund health services in security in the interest of fighting the Taliban national efforts to build the governance capacity of the newly elected administration of President Hamid Karzai. The highly political global war on terrorism can lead donors to make decisions that are not optimal from a capacity development perspective.

A comparison of the context of capacity development efforts in fragile states to the context in neo-fragile states

Differences:

- Need to consider sustainability and environment of endogenous capacity
- Short timeframe
- Change agents and champions, political will and ownership
- Importance of adopting innovation bundles
- Systems perspective to capture complexity and interconnections

Similarities:

- Pressure to restore security and safety
- Limited capacity to build on
- Often not truly rebuilding, but creating new capacities
- High level of social capital, institutional resilience
- Paper-political environment

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... in very small ways as they build their capacity for oversight and to enable them to make their vision heard.

Service user views influenced strengthening

A related trade-off is how to balance the humanitarian imperative to provide immediate services in low-capacity settings against the need to rebuild public institutions and their capacity to deliver services. The immediacy of humanitarian needs leads to a reliance on international actors (such as NGOs and private contractors) and on local NGOs who were not present following decades of war and destruction, particularly given the significant numbers of armed ex-combatants who were in place. However, concentrating capacity development largely on immediate security (disarmament, demobilization and reintegration) does not address the factors that contribute to long-term security and stability. Capacity development needs to target service delivery and employment generation, and to work ways to support conventional government actors in providing health services.

Strengthening the sector is a necessary component of capacity development, but is not the complete answer. Local capacity is required as well, although developing it is difficult due to a variety of reasons. Donors often tend to focus their efforts at the central government level due to logistics (it is easier to work in capital cities), choice of international business-level actors used to be both more visible and eager at interacting with donors, and an occasion the belief that appropriate rebuilding strategies must start there.

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... emerge as well as by encouraging participation of local actors rather in planning and implementation processes.

Further reading

- Brinkerhoff, D. (2007) *Capacity Development in Fragile States*, RTI Research Paper 102, Center for a World of Public Management, www.capacity.org/102
- Brinkerhoff, D. (2007) *Assessing a Post-conflict Health System*, RTI Research Paper 103, Center for a World of Public Management, www.capacity.org/103
- Jones and W. (2007) *Assessing a Post-conflict Health System*, RTI Research Paper 104, Center for a World of Public Management, www.capacity.org/104
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Capacity.org is an online magazine for practitioners and policy makers. Derick Brinkerhoff's December 2007 article was based on a discussion paper titled "Capacity Development in Fragile States," published by the European Centre for Development Policy Management.



Studying 2008 Voter Behavior

As part of an effort to better understand voting and political participation in the United States, researchers at RTI have joined with colleagues at the University of Michigan, Stanford University, University of Texas, and University of Washington to conduct the survey for the American National Election Study (ANES). Funded by the National Science Foundation, ANES generates data for election research by policy makers, political scientists, psychologists, economists, sociologists, educators, and others.

“Studying voter behavior is essential for understanding the changing American culture,” said Joe Eyerman, PhD, senior research methodologist and project director for the study. “It helps our leaders design programs for a more representative government.”

RTI survey researchers and statisticians use advanced data collection systems and analysis techniques to elicit high-quality, valid, and reliable data that are primary to the success of our clients and to the making of sound public policy. We support public- and private-sector studies that explore the causes of and solutions to the world’s most pressing problems.

Questions in the survey examine voting trends, such as the roles of race and religion in voter behavior, the media’s impact on voter decision making, the effect of education levels on voter participation and candidate choice, and attitudes toward voting and political participation. The survey includes questions specific to the 2008 election as well as questions that have been included since 1948.

This year marks the first time the study was conducted in both English and Spanish and included an increased sample of the Latino and African American populations, allowing for analysis of this rapidly growing segment of the electorate.

In the early fall of 2008, RTI began collecting pre-election data. At the conclusion of the study, we will have interviewed more than 2,200 participants from across the country.

Sexual Victimization in U.S. Correctional Facilities

This year, RTI completed the first-ever nationally representative survey on sexual victimization among the nation’s incarcerated population. Known as the 2007 National Inmate Survey (NIS), the survey was mandated by Congress under the Prison Rape Elimination Act of 2003. In collaboration with the Bureau of Justice Statistics (BJS), we interviewed more than 70,000 inmates

at 146 state and federal prisons and 282 local jails—all randomly selected—across the nation.

Based on the survey data, an estimated 4.5 percent of prison inmates and 3.2 percent of jail inmates reported experiencing one or more incidents of sexual victimization, either between inmates or between inmates and correctional facility staff. In contrast to previous BJS estimates, which were based solely on facilities’ administrative records, NIS figures are based on data gathered directly from inmates and include unreported incidents.

An important component of reducing sexual assaults is understanding the magnitude of the problem.

“An important component of reducing sexual assaults is understanding the magnitude of the problem,” said Rachel Caspar, RTI’s principal investigator on the project. “The survey methodology we developed allowed us to enhance privacy for all prisoners who participated in the study, even those with limited literacy skills, while at the same time minimizing burden to the facilities.”

Interviewers used a technology pioneered at RTI for audio computer-assisted self-interviewing (ACASI). ACASI has been found to increase

the accuracy of information people will provide about sensitive topics such as sexual assault and drug use, where under-reporting is a common occurrence.

RTI researchers are now directing their attention to the 2008 survey, which includes a random sample of 501 facilities and interviews with approximately 100,000 inmates. Combined with other sources, NIS data will help officials better understand the types of sexual victimization that occur in correctional facilities and help identify facilities with high rates of sexual assault.

Trends in Kids' Physical Activity

In the July 15, 2008, issue of the *Journal of the American Medical Association*, RTI statisticians Renate Houts, PhD, and Susan McRitchie co-authored, along with researchers from three universities, a study of physical activity among children in the United States.



As part of our role as data center for the Study of Early Child Care and Youth Development, RTI statisticians supported a study of trends in physical activity among children ages 9 through 15.

Under a cooperative agreement with the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD), researchers measured the moderate-to-vigorous physical activity of more than 1,000 youths in 10 cities, and found that daily activity decreased from about three hours at age 9 to under one hour at age 15.

In support of the study, RTI statisticians modeled changes in physical activity using growth curves and attempted to explain the dramatic drops using demographic variables. Gender and age were the most important determinants of activity between the ages of 9 and 15 years. Boys engaged in approximately 20 more minutes of moderate-to-vigorous physical activity per day than girls, and children in general became less active as they aged.

This project exemplifies the analytical support we provide to researchers studying data from the Study of Early Child Care and Youth Development, for which we serve as the data acquisition and analysis center. In that role, we helped develop study materials, trained research site staff, developed and implemented data collection systems, and are managing all study data. To date, our scientists have collaborated with network investigators on more than 70 peer-reviewed publications that have appeared in leading education, medical, and child development journals. These publications inform public debate on issues related to child care, child development, and families.



Milestones in Survey and Statistics

- 1972 RTI researchers develop SUDAAN®, a statistical software package for the analysis of correlated data.
- 1979 RTI pioneers the use of computer-assisted telephone interviewing (CATI) in surveys.
- 1988 RTI undertakes the National Survey on Drug Use and Health, the major source of data on substance use and abuse for policy makers.
- 1995 RTI becomes one of the first organizations to put audio computer-assisted self-interviewing (ACASI) to use in large-scale field interviewing.

Economic and Social Policy Research



RTI's experts in economics, demography, health, education, urban planning, and public financing study the wide range of issues in economic and social policy facing our society and provide policy makers with independent, objective insights.

During FY2008, the information and analyses we provided our clients helped to inform and improve public policy discourse and to advance economic and social development decision making on topics including long-term care financing, technology incubators, and homeland security.

the federal government, widespread out-of-pocket costs for consumers, an institutional bias in the delivery system, and inadequate quality of care—as well as funding,” said Joshua Wiener, PhD, Senior Fellow and program director for aging, disability, and long-term care at RTI and leader of the research team. “However, there is time before the baby boom generation will significantly increase needs for long-term care, which provides society with an opportunity to improve the system for people in need of those services before a large increase in demand occurs.”

Wiener's review of the research showed that the demand for long-term care services is likely to at least double by 2040, and the price of long-term care services will have a big impact on the level of expenditures. His team found that under the current system, most older people will not have private long-term care insurance in the future because of its high cost.

Assessing Economic Impacts of Technology Incubators

During FY2008, we also continued our work analyzing innovation-based economic development programs and advanced technology initiatives. We conducted two studies, one in North Carolina and one in Maryland, that quantified the economic benefits technology incubators generate for regional economies. Policy makers use our studies to assess performance and guide policy directions.

Business incubation is a business support process that accelerates the successful development of start-up companies by providing entrepreneurs with an array of targeted resources and services.

“Technology incubators help small start-up companies bridge the challenging period between a great idea and a sustainable business,” said Alan O'Connor, an RTI economist who led the North Carolina study. “The study showed how the incubator invigorates the local knowledge-based economy, attracting new business to North Carolina and home-growing higher-paying jobs.”

Technology incubators help small start-up companies bridge the challenging period between a great idea and a sustainable business.

In North Carolina, the group found that start-up companies supported by the incubator on North Carolina State University's Centennial Campus developed more quickly and enjoyed better business opportunities than if they had located elsewhere. That incubator was established in 1999 as a mechanism through which NC State could commercialize university technology and support the entrepreneurial activities of faculty, staff, and students.

Assessing Long-Term Care Financing

An RTI report published during FY2008 provided a framework for policy makers and others working to solve how to pay for baby boomers' care needs in 20 to 40 years. This major undertaking involved compiling and analyzing all major studies to date and performing projection modeling on the issue.

The result, *The NIC Compendium Project: A Guide to Long-Term Care Projection and Simulation Models*, is a body of knowledge that is helping policy makers and others determine the best combination of public- and private-sector funding that will be needed to pay for the nation's growing care needs, especially when baby boomers reach their 70s and 80s.

“There are many problems with the current long-term care system, including financial burden on states and

In Maryland, start-up companies supported by technology incubators increased the gross state product by \$1.2 billion in 2006. “Maryland has a strong technology economy, a wealth of research centers, a concentration of high-tech employment, and exceptional political support for incubation,” said Sara Lawrence, a senior economic development analyst at RTI. “These factors provide a strong foundation on which additional technology incubators could be built.”



RTI's research showed that start-up companies supported by the Technology Incubator on North Carolina State University's Centennial Campus developed more quickly and enjoyed better business opportunities than if they had been located elsewhere.

Lawrence and her fellow researchers found that current and graduate companies of Maryland's 18 incubators generated \$104 million in additional state and local tax revenue during 2006. Notably, these companies directly employed more than 5,300 people and indirectly supported more than 8,600 jobs throughout the state.

Establishing an Institute for Homeland Security Solutions

We also launched the Institute for Homeland Security Solutions (IHSS), a collaborative effort with Duke, the University of North Carolina at Chapel

Hill, and the North Carolina Military Foundation, which will conduct a wide consortium of social science and policy-related research intended to strengthen homeland security.

IHSS is an independent research consortium managed by RTI with research conducted by faculty, staff, and students at the collaborating institutions.

The federally funded research collaboration will conduct applied social science research to improve detection, analysis, and understanding of homeland security threats and to enhance response and recovery efforts.

Funded with \$6.9 million from the Department of Homeland Security, the institute will be managed as a collaboration.

“The Institute for Homeland Security Solutions represents an important opportunity to bring to bear RTI's considerable capacity for applied research in science and technology, including the social and behavioral sciences, engineering, and training systems, to better secure our nation,” said Joe Eyerman, PhD, a senior research methodologist at RTI.

The institute will focus on developing near-term solutions to practical, real-world homeland security challenges, including critical policy and operational implications of new technologies and information analysis tools. The institute will also conduct research to improve understanding and analysis of emerging homeland security threats.

The institute will fund projects conducted by consortium members and will also seek partnerships with other universities, research organizations, and the private sector to carry out its objectives.



Milestones in Economic and Social Policy

- 1965 RTI surveys more than 11,000 families to assess the impact of the North Carolina Fund, an antipoverty program that sought to create educational and employment opportunities for low-income families.
- 1975 RTI's collection of data on crime and misbehavior in U.S. schools culminates in publication of the report *Violent Schools—Safe Schools*.
- 1976 RTI's study for the U.S. Department of the Treasury shows that taxpayers would save millions of dollars if the government eliminated the penny and replaced the dollar bill with a more distinctive coin.
- 1982 RTI undertakes its first assessment of the Special Supplemental Food Program for Women, Infants, and Children.

Energy and the Environment



Climate Change

RTI draws on our expertise in engineering, environmental science, and economics to support research into the causes of—and answers to—global climate change.

This year, our economists and chemical engineers alike made headway toward finding new, affordable ways of reducing levels of greenhouse gases. These projects targeted fossil fuel combustion and tropical deforestation, the two leading causes of carbon dioxide emissions, and exemplify the broad range of climate change research under way at RTI.

Capturing Power Plant Emissions

Given their significant share of carbon dioxide emissions, existing coal-fired power plants present an enormous opportunity for the development of

Whether we are working on behalf of government or industry, RTI continues to move closer to our shared goals for clean energy and a healthier environment. In FY2008, our comprehensive expertise in environmental management led to our selection by the government of Abu Dhabi to help it develop a sustainable program that balances economic development and environmental protection. This new project and the work we highlight here exemplify the tremendous potential of energy and environmental research to improve the human condition worldwide.

technologies to reduce emissions and mitigate global climate change.

With funding from the Department of Energy's National Energy Technology Laboratory, RTI is developing a solution for the cost-effective retrofitting of existing coal- and natural gas-fired power plants with a technology for capturing carbon dioxide emissions. Based on an inexpensive, dry, regenerable sorbent, our Dry Carbonate Process has consistently demonstrated greater than 90 percent carbon dioxide removal from both simulated and actual flue gas. This technology exhibits many competitive advantages that make it a leading candidate for post-combustion carbon dioxide capture applications.

"Our process uses no hazardous or toxic materials and generates no hazardous wastes," said Tom Nelson, PhD, who directs RTI's research in carbon capture. "Its performance is not degraded by contaminants from coal or gas combustion, and perhaps most important to industry, it's less energy-intensive and requires lower capital and operating costs than the conventional monoethanolamine solvent process."

In FY2008, we improved the process by redesigning the adsorption and regeneration reactors and optimizing the sorbent to match the new reactor design. The new designs feature better heat control, require less sorbent circulation, cause less attrition to the sorbent particles, and utilize more of the reformulated sorbent's increased carbon

dioxide capture capacity. RTI also began exploring ways of adapting the Dry Carbonate Process for use in cement plants, natural gas processing plants, and other carbon-emitting industries.

Our process uses no hazardous or toxic materials and generates no hazardous wastes.

In the coming year, RTI will continue working toward the commercial release of our Dry Carbonate Process and will launch a separate Department of Energy-funded effort also focused on retrofitting existing power plants.

The new project focuses on novel high-performance membrane materials, improved designs for hollow-fiber membrane modules, and efficient integration of the system into an existing plant. Because membrane-based processes are energy-efficient, easy to operate and maintain, and easy to retrofit to existing processes, they may be a promising solution for reducing emissions from existing plants.

The Economics of Tropical Deforestation

In July, a study co-authored by RTI senior economist Robert Beach, PhD, and published in the *Proceedings of the National Academy of Sciences* revealed that paying owners of tropical forest lands for the carbon stored in the forests on those lands can provide a strong

disincentive for deforestation, making it a relatively low-cost option for reducing greenhouse gas emissions.

Using three economic models of global land use and management, Beach and a team of researchers from the International Institute of Applied Systems Analysis, Ohio State University, Lawrence Berkeley National Laboratory, the U.S. Environmental Protection Agency, and the Center for International Forestry Research analyzed the potential contribution of avoided deforestation in mitigating carbon emissions.

The researchers found significant emissions reductions available for less than \$10 per metric ton of carbon dioxide. Tropical deforestation could be reduced by 50 percent for an annual cost of between \$17 and \$30 billion, which would lower carbon dioxide emissions by about 2 billion metric tons

per year, an amount equal to one-third of net U.S. greenhouse gas emissions.

“Tropical deforestation has long been recognized as a significant contributor to global greenhouse gas emissions,” said Beach. “But nobody knew how the costs of reducing emissions through avoided deforestation compared with alternative mitigation options.”

Helping Corporations Meet Environmental Goals

Across RTI, researchers take particular satisfaction in projects whose results will be immediately applied by our clients to help safeguard the environment for workers, consumers, and the public at large. The work we do to help commercial companies meet their environmental goals often gives us this opportunity.



Catalyst and sorbent development is an integral part of RTI's process development activities for the chemical, petroleum refining, transportation, and power production industries.

Milestones in Energy and Environmental Research

- 1978 RTI's assessment of toxicity problems in Niagara Falls, New York, introduces the world to the pollution at Love Canal.
- 1984 RTI is engaged by the National Toxicology Program to test and provide information about toxic chemicals in industrial and consumer products.
- 1986 The U.S. Department of Energy funds research at RTI to develop a cleaner and more efficient way of using coal to produce electricity and steam.
- 1999 The U.S. Environmental Protection Agency selects RTI for the chemical speciation of particulate matter with a diameter of 2.5 micrometers or less.
- 2002 RTI scientists develop new nanoengineered membranes that may enable a new generation of highly efficient separation devices for use in chemical and fuel production and environmental cleanup.

Resource Sustainability and Carbon Management

In recent years, corporations have begun to incorporate resource sustainability and carbon management into their core business strategies.

Balance sheet pressures are driving an interest in the sustainable use of energy, water, and land resources, as well as in preservation of air quality.

“The competitiveness of commercial clients increasingly depends on efficient allocation, management, and use of resources,” noted Rebecca Nicholson, senior director for environment, health, and safety. “They need solutions that integrate science, technology, economics, business, and decision analysis.”

Environmental scientists and engineers at RTI provide these integrated solutions, helping companies develop and execute sustainable environmental practices by applying our expertise in

environmental management across agricultural and industrial sectors.

One example this year comes from the waste management sector. Using our in-house solid waste decision support tool, we worked with commercial technology vendors to assess the potential for energy production and carbon emissions reduction associated with gasification, pyrolysis, plasma treatment, and other emerging waste management technologies. This work is key in supporting the commercial sector’s response to energy and climate change initiatives at the state, national, and global levels.

Verifying the Proficiency of Asbestos Testing Laboratories

For more than 600 laboratories conducting asbestos analysis in the United States and 20 other countries, RTI is the sole provider of a suite of services necessary to maintain and verify their analytical proficiency.

We manage asbestos proficiency testing programs on behalf of government agencies and trade associations, and our geologists and microscopists are active in applied asbestos research and developing and evaluating new methods for asbestos testing.

In April 2008, RTI’s reputation in this area earned us recognition from the American Association for Laboratory Accreditation. This accreditation as a proficiency testing provider is based on internationally accepted criteria for competence and is mutually recognized by the International Laboratory Accreditation Cooperation, whose members span 60 countries.

Also this year, RTI was contracted by the government of South Korea to establish its first proficiency testing program for asbestos labs. We distributed samples constituting the program’s first test round to approximately 40 laboratories in September. Results from this and future test rounds will be used by Korea’s National Institute for Environmental Research to help accredit laboratories in that country.

RTI provides similar proficiency testing services and reference materials to approximately 60 U.S. laboratories that conduct forensic drug testing and to more than 250 laboratories worldwide that test for the presence of environmental lead in paint, soil, and dust.

Managing Environmentally Stressed Properties

As a result of legal and regulatory requirements, many companies today are seeking help to manage the idle or surplus properties in their real estate portfolios. Since 2007, RTI has been partnering with Marsh Inc., a global risk and insurance services firm, to help corporations evaluate these properties. Using a Web-based decision support



Research geologist Stacy Doorn analyzes and characterizes the asbestos content of building and insulation materials. This year, RTI’s reputation earned us internationally recognized accreditation as a provider of asbestos proficiency testing and led the government of South Korea to select us to establish its first proficiency testing program for asbestos laboratories.

system called SBS DiscoverySM that integrates financial and environmental analysis algorithms, we can assess the potential value of a company's real estate holdings, including brownfields, relative to the cost of remediation and other business factors.

In January 2008, RTI was awarded a Business Achievement Award in information technology from *Environmental Business Journal* for the development of SBS Discovery. Fortune 50 companies, including petroleum, chemical, and manufacturing firms, have used SBS Discovery to evaluate properties with good potential for sale or reuse.

In January 2008, RTI was awarded a Business Achievement Award in information technology from Environmental Business Journal for the development of SBS Discovery.

"A significant number of the more than 450,000 brownfields in the United States represent nonstrategic surplus assets with good development potential," said Glenn Osmond, who directs the SBS Discovery project at RTI. "Yet they frequently appear on balance sheets of major corporations at nominal value."

Turning Second-Generation Biomass into Fuel

In 2008, RTI continued efforts to develop technologies necessary to make second-generation biofuels—fuels not derived from food crops—into a viable alternative to fossil fuels. Applying our expertise in high-temperature chemical reactions, catalyst and sorbent

development, and process development, we are working to make biomass-to-liquids processes technically and economically viable.

This year, under a project funded by the Department of Energy (DOE), catalyst testing of our Therminator technology was completed. The Therminator process removes tar, sulfur, and nitrogen from raw biomass syngas using a dual fluidized-bed reactor system and a novel, attrition-resistant, triple-function catalyst.

Under a second DOE project, RTI engineers are working with a commercial partner to screen catalysts that will convert clean biomass syngas into ethanol and other alcohols.

In the coming year, we will integrate and test these two technologies into a pilot-scale biomass gasifier at the University of Utah. With support from the Golden Leaf Foundation, the test will process one-half ton per day of biomass feedstock supplied by North Carolina State University. This project marks the first success for the Research Triangle Energy Consortium, which seeks to apply the collective expertise of RTI, NC State, Duke University, and the University of North Carolina at Chapel Hill to the world's energy problems.

RTI is also exploring the use of pyrolysis, which is the thermal decomposition of biomass in the absence of oxygen or any other reagents. In an internally funded project, we are developing catalysts that selectively extract oxygen during the pyrolysis process, producing a bio-oil intermediate that can then be refined to produce usable fuels. This effort, along with our research in biomass gasification, has great potential to contribute to the development of a robust biofuels industry.



With active R&D projects in biomass gasification and pyrolysis, RTI is working to make second-generation biofuels—fuels derived from the non-food parts of food crops or from non-food crops—into a viable alternative to fossil fuels.

Advanced Technology



Expanding R&D for Commercial Firms

RTI engineers and scientists are asked with increasing frequency by commercial firms to apply their expertise to solve complex practical problems. That increase in frequency is a reflection of our reputation and our enhanced focus on applied science.

“In 2004, only 3 percent of what we did was for industry. In 2008, a full third of the energy and advanced technology R&D we performed was on behalf of the private sector,” said David Myers, PhD, vice president of engineering and technology.

We work with companies of all sizes, ranging from venture-funded start-ups to Fortune 100 companies. Because the technological solutions we develop on behalf of industry improve products

At RTI International, research projects in electronics and materials science span early- and late-stage research and development. As a leader in these fields, we partner with fellow experts at industrial, academic, and national laboratories to develop our technologies into commercially valuable assets. This year, RTI engineers realized major milestones in R&D programs that promise to advance the science and practice of medical diagnostics, human exposure research, and high-performance computing.

that are bound for the marketplace, this work embodies the element of our mission that emphasizes turning knowledge into practice.

In 2008, a full third of the energy and advanced technology R&D we performed was on behalf of the private sector.

Energy Technologies

Commercial energy clients come to RTI for our long-standing expertise in gasification, catalysis, membranes, and biofuels, and especially for our proven ability to take a process from the bench scale to the commercial scale. By developing both practical and scalable solutions to clients' problems, we are often able to speed time to market.

For example, during FY2008, we worked with companies to find unique catalytic solutions to produce renewable fuels from biomass, applying capabilities these clients did not maintain in-house. By quickly delivering workable solutions, we are able to meet the expectations of the private sector. This emphasis on practical application also benefits our government clients, whose research needs tend to have a longer time horizon but are similarly driven by practical problems.

Electronics and Biomedical Devices

RTI provides electronics and biomedical device manufacturers with access to highly specialized instruments and, more importantly, to the collective experience of our researchers.

“Clients come to us with specific challenges not readily solvable with existing technology,” said senior research engineer Jim Carlson.

For example, in FY2008 we adapted the patented MEMS artificial eyelid device to create an industrial valve product for AFA Controls of Moline, IL. Our MEMS (for microelectromechanical system) device replaces older solenoid mechanisms to create a valve with better reliability, faster speed, and lower power consumption. Target applications for the valve are biomedical instrumentation and industrial pneumatics.

With funding from the National Institutes of Health, RTI demonstrated a MEMS scanning mirror that is better suited than current technology for use in optical coherence tomography, a medical imaging modality. Our MEMS scanning mirror has greater than 10 degrees of scan range, which is better than most one-dimensional scanners reported in the literature, and it is smaller, requires less power, and enables scanning in two dimensions to create 3-D images.

Also this year, RTI's electronics engineers collaborated with our experts

in aerosol technology to create a novel drug delivery system, and we integrated newly developed nanofiber sensors into a low-power, proof-of-concept handheld device to demonstrate their effectiveness.

Product Safety and Performance Evaluations

Another reason commercial firms come to RTI is our independent status and long-standing reputation for unbiased assessment of product performance. We provide research and analytical services to technology manufacturers, purchasers, and trade associations to assess the safety and performance of consumer products.

“In many cases, these clients are capable of performing their own analyses,” said Elizabeth Hill, senior director for environmental and industrial sciences, “but they need independent verification.”

Our capabilities go beyond routine testing, enabling us to conduct highly specialized analytical research. In one example this year, we began developing new methods for testing volatile organic compound emissions from carpeting and evaluating their potential effect on consumers with asthma. This

project exemplifies RTI's ability to bring together teams of experts across scientific disciplines, another benefit to our commercial clients.

Materials Science

Clients from a variety of industries rely on RTI's expertise in synthesis, characterization, and modeling to design new materials and improve the performance of existing materials.

For example, we are leading a team working to improve the cementing procedures used in oil field operations for isolating different geological zones, preventing contamination of groundwater, and stabilizing the structure of wells. RTI was chosen for this work because of our proven record of effectively managing complex research projects and our ability to form effective partnerships with best-in-class organizations, including universities and private companies. Through RTI's leadership, long-standing scientific mysteries in cement chemistry are being solved and applied to the development of new product concepts for our client.

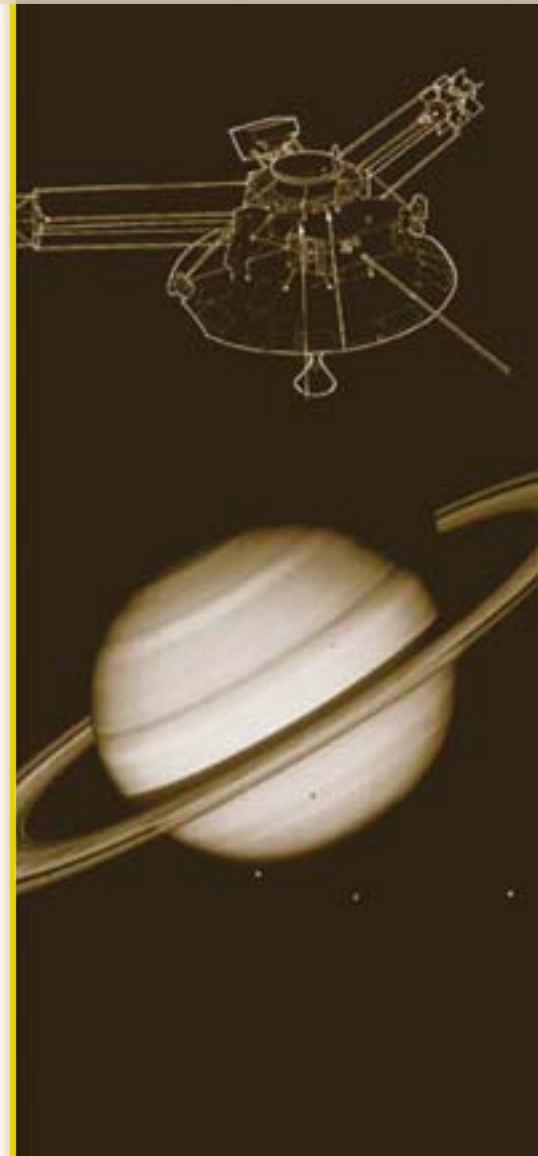
New Device Facilitates Exposure Studies

Understanding exposures is critical for the protection of human health, but for years, the weight and bulkiness of exposure monitoring technology have hampered efforts to collect accurate data regarding the exposure of children, emergency responders, and military personnel to a wide range of environmental contaminants.

To address this problem, RTI developed a palm-sized, wearable device that measures exposures to a wide range of airborne contaminants and records how those exposures occurred. The MicroPEM™ (for micro-miniature personal exposure monitoring)



RTI's MicroPEM™ device collects air particles to determine the levels of contaminants in various environments. Its small size and quiet operation enable the device to be placed close to individual breathing zones.



Milestones in Advanced Technology

- 1962 RTI's first microelectronics research involves semiconductors, integrated circuits, and thin-film capacitors.
- 1972 Micrometeoroid detectors built at RTI fly on NASA's *Pioneer 10* as it explores Jupiter, Saturn, and the asteroid belt.
- 2001 RTI announces the first significant breakthrough in thermoelectric research in 40 years: a new thin-film superlattice material that is 2.4 times more efficient and 23,000 times faster than current technology.

collects air particles to characterize contaminant exposure levels in various environments.

Based on underlying technology developed through internal funding, MicroPEM has a wide range of applications. RTI researchers have created different versions of the device designed for collecting samples indoors, outdoors, and in automobiles.

“The large size and weight of older systems limits their usefulness in monitoring exposures in populations such as children and emergency responders,” said Charles Rodes, PhD, RTI Senior Fellow in aerosol exposure research.

MicroPEM’s small size and quiet operation are facilitated by a power-efficient design that allows the device to be placed close to individual breathing zones, providing accurate exposure estimates in many situations. An active flow system collects and sizes particles in exactly the same aerodynamic manner as the human respiratory system.

“Obtrusive personal exposure monitors get in the way and are simply not worn frequently enough to allow accurate exposure data collection,” noted Rodes. “The MicroPEM is tiny enough to be placed in almost any location and worn by even small children and by soldiers in combat situations.”

In the coming year, we will continue to enhance the technology under a four-year grant from the National Institute of Environmental Health Sciences to develop an even smaller sampling and sensing system that can be worn by asthmatic children to define aerosol levels that trigger increases in symptom severity.

Improving Ultrasound Technology

With funding from the National Institutes of Health and in collaboration with Duke University, RTI continues R&D of miniature two-dimensional arrays of ultrasound transducers. At just 2 square millimeters, the RTI transducer array is small enough to fit inside the tip of a cardiac catheter and may prove to be a breakthrough technology for diagnostic medical imaging.

RTI’s 2-D transducer array makes it possible for catheters to project from the tip of the probe. This forward-looking orientation will enable surgeons to see much more than they can using current catheters.

Until now, arrays have been too large for this use, expensive to produce, and insufficient for medical imaging.

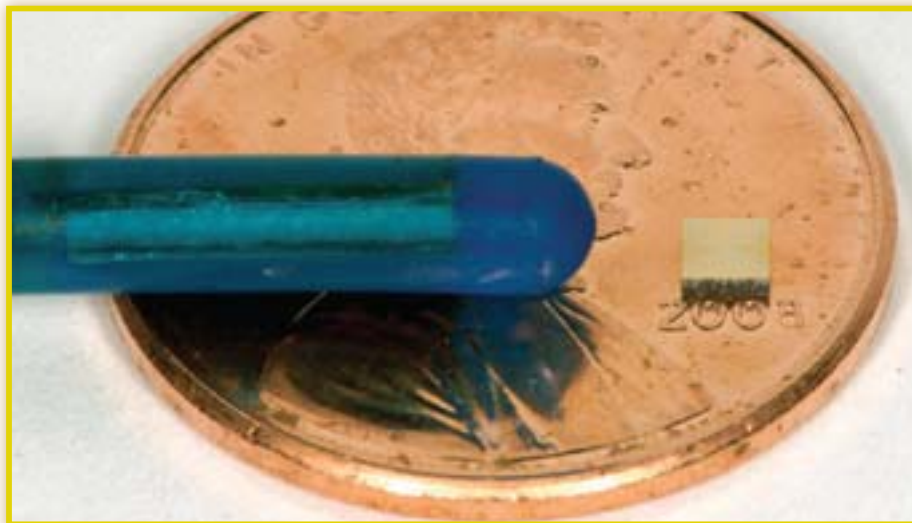
Applying our expertise in MEMS technology and microfabrication,

RTI created a silicon platform and micromachined a 2-D transducer array that produces high-quality 3-D images. At one-sixteenth the size of current transducers, the RTI technology has demonstrated an ability to generate similar acoustic pressure with lower electrical losses.

This year marked another key accomplishment for the RTI–Duke team, who successfully produced a pulse-echo image in which features embedded in what is known as a tissue phantom could be identified.

Current efforts to construct initial prototype ultrasound probes to be tested at Duke in 2009 will demonstrate the significant practical advantages of RTI’s microminiature transducer array.

“Current ultrasound catheters are oriented to the side, producing image ‘slices’ of vessels they pass through or features they pass over,” said David Dausch, PhD, principal investigator of the project. “RTI’s 2-D transducer array makes it possible for catheters to project from the tip of the probe. This forward-looking orientation will enable surgeons to see much more than with current catheters.”



At 2 square millimeters, or one-sixteenth the size of current transducers, RTI’s ultrasound transducer array is small enough to fit in the tip of a cardiac catheter.

When integrated with Duke's real-time 3-D ultrasound system, RTI's catheter will enable cardiac surgeons to visualize vulnerable plaque before the catheter disturbs it. This will greatly improve ablation therapies, for example, to remove plaque. The forward-looking ultrasound catheter may also improve image guidance and postoperative evaluation for cardiac stent placement procedures and other minimally invasive surgeries.

To ensure that the resulting technology will be suited for real-world application in exploratory and diagnostic procedures, RTI researchers have begun consulting with cardiovascular, urological, and other surgeons from several hospitals.

"Our goal is to develop a miniaturized catheter that performs better—and can be manufactured more cheaply—than current technology," said Dausch.

Innovations in Microsystem Integration Lead to a New Company

In June 2008, RTI launched its third spin-off company in eight years. The newly formed siXis, Inc., will commercialize an RTI technology that promises to increase processing performance while reducing the size of circuits, decreasing power requirements, and improving reliability.

This new circuit board technology integrates packaged and unpackaged semiconductor devices on a large-area silicon substrate with through-silicon vias, which are vertical electrical connections that pass through the silicon wafer.

Previously, silicon circuit boards were limited to approximately 1 square inch and demonstrated reliability problems at larger sizes. The siXis technology is expected to enable production of

silicon circuit boards as large as 24 square inches and paves the way to replace traditional fiberglass printed circuit boards in high-performance applications.

Led by President and CEO John Goehrke and financed by RTI and venture capital firm Intersouth Partners, siXis will initially apply the technology to the reconfigurable computing market, in which high performance, low power, and small size are critical.

"Industry demands for smaller, faster, and more energy-efficient electronics create some very exciting possibilities for this new technology," Goehrke said. "With important development work at RTI behind us and the support of strong financial partners, we look forward to growing the company."

The spin-off of siXis leverages nearly 10 years of research and development in 3-D microsystem integration by members of RTI's Center for Materials and Electronic Technologies.

"This represents the product of many advances in microsystem integration that began in the early 2000s," said Dave Myers, PhD, RTI vice president of engineering and technology, "when these researchers were among the first in the U.S. to demonstrate 'through-silicon via' and 'through-silicon interconnect' technologies."

In fact, siXis became a key client of RTI's overnight, as our materials and electronics researchers continue to work with siXis engineers to develop their core technology.

In addition, the underlying R&D program that was the springboard for siXis continues to attract many externally funded projects to RTI, including a recent multimillion dollar award from the Defense Advanced Research Projects Agency for further advancement of our 3-D integration technology.



Our latest spin-off, siXis, Inc., will commercialize an RTI technology that allows circuits to be densely packaged into a silicon substrate, greatly increasing microprocessing efficiency.

Education and Training



Corrie Blankenbeckler

Improving Girls' Education in Egypt

As part of an effort to improve the quality of education and learning achievements among Egyptian girls, in the spring of 2008 RTI launched the Egypt Girls' Improved Learning Outcomes project, funded by the U.S. Agency for International Development (USAID).

Together with the Egyptian government, local communities, and international partners across rural areas of Upper Egypt, we are expanding coverage of girls' education in remote areas, improving the quality of teaching and learning, and strengthening school management and governance in communities with the highest percentages of out-of-school girls.

Focusing on kindergarten through ninth grades, the project is helping schools adopt instructional

At RTI, we conduct rigorous studies to assess and improve the quality of early development and education in the United States and many other countries. Our studies address real-world problems, with a view to informing public policy and improving educational opportunities and experiences for children and adults.

Integrating the latest in learning technologies with the subject matter expertise of our scientists, we tailor our training solutions to the needs and expectations of today's professionals.

methodologies that integrate active learning, information technology, comprehensive assessment, and use of local resources and knowledge.

Using an approach known as school-based reform, RTI and our partners are training administrators to work collaboratively with communities and trustee boards in developing school visions, establishing school improvement plans, and evaluating progress towards accreditation based on self-assessment tools. We are also working to enable teachers, administrators, and others to contribute to sustained standards-driven quality, accountability, and improved learning outcomes.

In addition, we are helping foster new public-private partnerships as a means of maximizing the use of scarce resources allocated for school construction and maintenance.

Training Forensic Scientists

With rapid changes in technology and laboratory procedures, forensic scientists have a pronounced need for continuing education. However, budget constraints and heavy caseloads make it difficult to get this training.

To address this issue, RTI began work in FY2008 under a cooperative agreement with the National Institute of Justice (NIJ) to develop and deliver Web-based training for forensic science professionals.

"This project enables us to provide a cost-effective means for institutions and individuals to get high-quality, interactive instruction by leveraging the time and space reduction capability of the Web," said Peter Stout, the project's co-principal investigator.

RTI has delivered courses covering several of the technically complex disciplines that make up forensic science, including forensic toxicology, analysis of controlled substances, medico-legal death investigation, and ethics and professional responsibility. Currently provided at no cost, the modules are available both as live, virtual classrooms led by a subject matter expert and as on-demand, self-



Web-based training courses designed by RTI are helping forensic science professionals in the U.S. and abroad keep abreast of rapid changes in technology and laboratory procedures.

paced training. To date, well over 1,000 students—representing all 50 states and 15 countries—have registered.

In the future, we will work to provide training for ancillary professionals such as law enforcement, judicial and court systems, and forensic behavioral and health care providers.

Assessing Early Grade Reading Around the World

In many developing countries, children enrolled in primary school for as many as six years cannot read and understand a simple text. These students are more likely to drop out of school and perpetuate a generational pattern, as illiterate parents are often unable to ensure quality education for their children.

To develop better ways to teach children to read and write, educators worldwide need a reliable tool that provides quick, easy-to-interpret feedback on students' literacy. With support from USAID and the World Bank, RTI has developed such a tool. Today, we and others are using the tool to help educators in low-income countries break the pattern of illiteracy.

The Early Grade Reading Assessment (EGRA) is a 15-minute test administered orally to students in the early grades of primary school. EGRA evaluates students' foundation literacy skills, including pre-reading skills, which have been shown to predict later reading abilities. Education ministries and their donor partners can then identify and address learning barriers before students grow older and their odds of achieving literacy dwindle.

EGRA was designed to complement conventional paper-and-pencil exams, which inherently assume basic literacy.

“In low-income countries, the trouble is that most students score below the ‘floor’ of those tests,” said RTI senior education researcher Amber Gove. “So the tests reveal only what the students do not know, and not what skills teachers can build on.”

EGRA was designed to complement conventional paper-and-pencil exams, which inherently assume basic literacy.

EGRA can be adapted to fit most alphabetic languages and cultural contexts and is gaining momentum as an instrument for quickly diagnosing students' early reading competencies.

USAID and the World Bank have backed pilot studies of EGRA across the globe to refine the instrument and the teaching recommendations that flow from the assessment results. To date EGRA has been field tested in 16 countries in nearly 20 languages, including Arabic.

In March 2008, RTI reconvened the international literacy experts who originally helped develop the instrument to present findings from these pilot studies.

Looking ahead, we will continue to lead EGRA enhancements and advocate that success in early reading become a goal of international organizations and education initiatives. In 2009, we plan to begin work on an Early Grade Mathematics Assessment to better understand and improve early numeracy skills.



Milestones in Education and Training

- 1969 RTI is awarded the first of many contracts to administer the National Assessment of Educational Progress survey.
- 1972 RTI designs, conducts, and administers the National Longitudinal Study of the High School Class of 1972.
- 1996 RTI begins assisting the South African government with its transition from the apartheid education system to a system that provides increasingly equal education opportunities for all citizens.
- 2005 The National Center for Education Statistics releases data from the Educational Longitudinal Study of 2002, conducted by RTI, about student achievement in reading and math.

Giving Back



As in the past, RTI responded as a company this year to support international disaster relief in a country where we work. Following the May 12 earthquake in the Sichuan Province of China, we donated \$10,000 to the International Federation of Red Cross and Red Crescent Societies in support of their efforts to care for the millions of people in need.

Supporting Science Education

RTI supports science education through corporate memberships in the North Carolina Museum of Natural Sciences, the Museum of Life and Science, and the North Carolina Zoo. This year, we donated an additional \$10,000 to the NC Zoo in support of its initiative to expand its use of biodiesel in place of regular petroleum fuel for trams, buses, tractors, and other equipment.

Consistent with our mission, RTI is committed to helping people by giving back to the communities where we are located. As a corporation, we support charities, service groups, and the environment through a generous philanthropy program and other community initiatives. Individually, many RTI staff members bring our mission to life by volunteering their time and resources to support our communities.

By using recycled vegetable oil from its own restaurants, the zoo is able to both reduce emissions and enhance the energy sustainability of its operations.

Reaching Out to Communities Where We Live and Work

Each year, RTI provides a corporate donation to Triangle United Way and to a local United Way chapter near one of our regional offices. This year, we donated a total of \$50,000 to the Triangle United Way and the United Way of Metropolitan Atlanta.

More importantly, the generosity of our staff members once again resulted in a record-setting United Way campaign for FY2008. In total, our staff members contributed \$259,600 to help those in need in our communities.

In addition to the United Way, RTI staff members organize many charitable giving efforts each year, including food drives and sponsorship of residents at local shelters and families in need during the holidays.

Staff members also hold the keys to RTI's Community Partnerships Program in nominating worthy community-service organizations. During FY2008, RTI provided more than \$165,000 to nearly 100 charities that serve communities in which we live and work, including Atlanta, Chicago, Research Triangle Park, San Francisco, Waltham, and the Washington, DC, area, as well as El Salvador, India, and South Africa. These organizations provide a wide range of community services, including programs that provide food, housing, and other basic



Students work together at AIM Academy in Washington, DC. AIM is a participating school in the Knowledge Is Power Program, a previous recipient of an RTI Community Partnerships contribution.

human needs, children's programs, and health programs.

"Thanks to the staff's nominations of terrific organizations for this program, RTI is able to give back to our local communities in important ways consistent with RTI's mission," said Sally Johnson, executive sponsor of the Community Partnerships Board and vice president of corporate affairs.



RTI's Rachel Royce (right) with Amy and Allie Plymale. Upon Royce's nomination, RTI donated \$1,000 to support the participation of "Allie's Gators," a team that includes Royce and RTI's Matthew Farrelly, in the 2008 Great Strides walk in Chapel Hill, NC. Great Strides is an annual fundraiser to support research and care programs operated by the Cystic Fibrosis Foundation.

Environmental Programs

Efforts to conduct our business in an environmentally sustainable fashion expanded in FY2008, particularly at our North Carolina headquarters location, which experienced a record-setting drought this year. Owing to infrastructure and operational changes, as well as individual conservation efforts of our staff, we were able to reduce water consumption by approximately one-third.

In January 2008, RTI received an award from NC GreenPower recognizing our support and purchase of renewable energy in North Carolina.

We also continued to support alternative commuting options to help staff members reduce their carbon footprint. This year, more than 225 staff members received a transit subsidy to offset the cost of taking a bus, train, or vanpool to work on a regular basis.

A particularly proud moment came when RTI staff member Pablo Torres was named 2008 RTP SmartCommuter of the Year. The SmartCommuter@RTP organization recognized Torres for his commitment to biking to work and for forming RTI's bike commuting group, RTI Cyclists. The group provides bike commuting information to RTI staffers and conducts internal bike commuting challenges. In the May 2008 challenge, 24 employees from



across RTI rode more than 3,100 miles to and from work, in effect saving 129 gallons of gas and preventing the release of 1.14 metric tons of carbon dioxide into the air.

This year marked our fifth as host of a community-supported agriculture (CSA) program, giving our employees and those of other companies in the Research Triangle Park area access to locally grown and organic produce and meats. RTI took on the role of CSA host to encourage sustainable agriculture practices and give staff access to fresh alternatives to supermarket foods, which travel an average of 1,300 miles before they reach consumers. The program also supports local growers and helps slow the loss of local farmlands.

Great Place to Work



At RTI, we strive to provide staff members with a healthy, supportive, and productive work environment. This commitment pervades our corporate culture and is evident this year in enhancements to our employee wellness programs and support for our working parents, as well as in the many ways we foster the professional development of our staff.

Employee Wellness

Our commitment to employee wellness was recognized by Business Leader Media with its 2008 “Wellness at Work” award for the Triangle region. The award recognized our comprehensive wellness program, which includes on-site exercise facilities and athletic activities, and on-site health screenings and vaccinations. This year, the program also offered staff members a \$100 incentive to complete a health risk assessment.

Supporting Parents

A new initiative that gained momentum during 2008 involved enhancing RTI’s support for our working parents.

We opened a new mothers’ lounge on the Research Triangle Park campus and expanded paid benefits for new

mothers. We also made it possible for mothers who deliver by cesarean section to obtain approval for the extended benefits earlier in the administration process.

To improve the support provided to adoptive parents, RTI increased the available reimbursement for legal expenses from \$5,000 to \$10,000 per adoption, up to a lifetime maximum of \$30,000.

Achieving Scientific Goals

Because staff members are the foundation of our success, RTI continues to expand the RTI Fellow Program, through which staff members can build their skills, broaden their knowledge, and further their research.

In FY2008, five new Fellows were named, bringing the total number to 23.

Our commitment to scholarly publication manifested this year in the launch of the RTI Press (www.rti.org/rtipress), which gives our scientists a new vehicle through which they can extend our reach to scientific and policy audiences.

In its first year, the RTI Press published seven reports spanning the fields of technology applications, health economics, postsecondary education, survey sampling, public finance modeling, and pharmacoepidemiology. Numerous manuscripts are currently undergoing the rigorous review process required for publication.



RTI’s comprehensive wellness program, which includes a fitness center and exercise classes on our Research Triangle Park campus, was recognized by Business Leader Media with its 2008 “Wellness at Work” award for the Triangle region.

Honors and Appointments

RTI encourages our research and technical staff to participate actively in scientific associations and organizations, for the benefit of their careers and in furtherance of science as a profession and a discipline. This year several RTI staff members were elected or appointed to advisory or leadership roles by government agencies or scientific associations, or earned awards in recognition of their expertise.

Dan Ahlport

Statewide Flexible Benefits Advisory Committee, State of North Carolina

Don Bailey, PhD

President, National Fragile X Foundation Board

Sheri Beam

2008 Exceptional Public Service Medal, National Aeronautics and Space Administration

Paul Biemer, PhD

Fellow, American Association for the Advancement of Science

Derick Brinkerhoff, EdD

Experts group, Partnership for Democratic Governance

Kathleen Lohr, PhD

National Advisory Council for Healthcare Research and Quality

Health Science Policy Council, International Society of Pharmacoeconomics and Outcomes Research

Core editorial board, National Guidelines National Quality Measures Clearinghouses

Antonio Morgan-Lopez, PhD

2008 Enoch Gordis Research Recognition Award for outstanding biomedical and psychosocial research, Research Society on Alcoholism and the National Institute on Alcohol Abuse and Alcoholism

Mary Muth, PhD

Chair, Food Safety and Nutrition Section, Agricultural and Applied Economics Association

Freya Spielberg

Rainer Arnhold Fellow, Mulago Foundation

Susan Sumner, PhD

Editorial board, *Journal of Applied Toxicology*



Books

Wechsberg, Wendee M., Jennifer J. Kasten, Nancy D. Berkman, and Amy Roussel. (2007). *Methadone Maintenance Treatment in the U.S.: A Practical Question and Answer Guide*. New York: Springer Publishing Company.

Finkelstein, Eric A., and Laurie Zuckerman. (2008). *The Fattening of America: How the Economy Makes Us Fat, If It Matters, and What to Do About It*. Hoboken, NJ: John Wiley & Sons.

Holden, Debra J., and Marc Zimmerman. (2008). *Practical Guide to Program Evaluation Planning: Theory and Case Examples*. Thousand Oaks, CA: Sage Publications, Inc.

Gallaher, Michael, Albert Link, and Brent Rowe. (2008) *Cyber Security: Economic Strategies and Public Policy Alternatives*. Cheltenham, UK: Edward Elgar Publishing.



RTI relies on an executive leadership team of experienced professionals to guide implementation of our business strategy and operations.

Together, these leaders direct RTI's research and development operations and also oversee administrative, financial, and logistics support for RTI's global enterprise. They are responsible and accountable to RTI's president and board of governors.

Social and Statistical Sciences Group

This group designs and conducts complex national surveys as well as economic, statistical, epidemiological, and social policy research for government agencies and commercial clients across the areas of health, environment, education, and justice.

International Development Group

This group helps build human and institutional capacity and promote sustainable economic development around the world by providing technical assistance, applied research and analysis, and other expertise in strategic planning, institutional development, performance management, information systems, and training.

Science and Engineering Group

This group conducts basic and applied scientific research for government and commercial clients in the fields of analytical chemistry, drug discovery and development, toxicology, energy research, environmental science, computer simulation, and advanced electronics and sensor technology.

RTI Health Solutions

A business unit of RTI, RTI Health Solutions provides leading consulting and research expertise to design risk management programs, evaluate disease burden, assess safety, and measure value for pharmaceutical, biotechnology, and medical device products.

RTI Leadership

Victoria F. Haynes

President and Chief Executive Officer

James J. Gibson

Executive Vice President and Chief Financial Officer

E. Wayne Holden

Executive Vice President, Social and Statistical Sciences

Lon E. Maggart

Executive Vice President, International Development Group

Satinder K. Sethi

Executive Vice President, Science and Engineering Group

Allen W. Mangel

Senior Vice President, RTI Health Solutions

Lorena K. Clark

Senior Vice President, Human Resources and Corporate Affairs

G. Edward Story

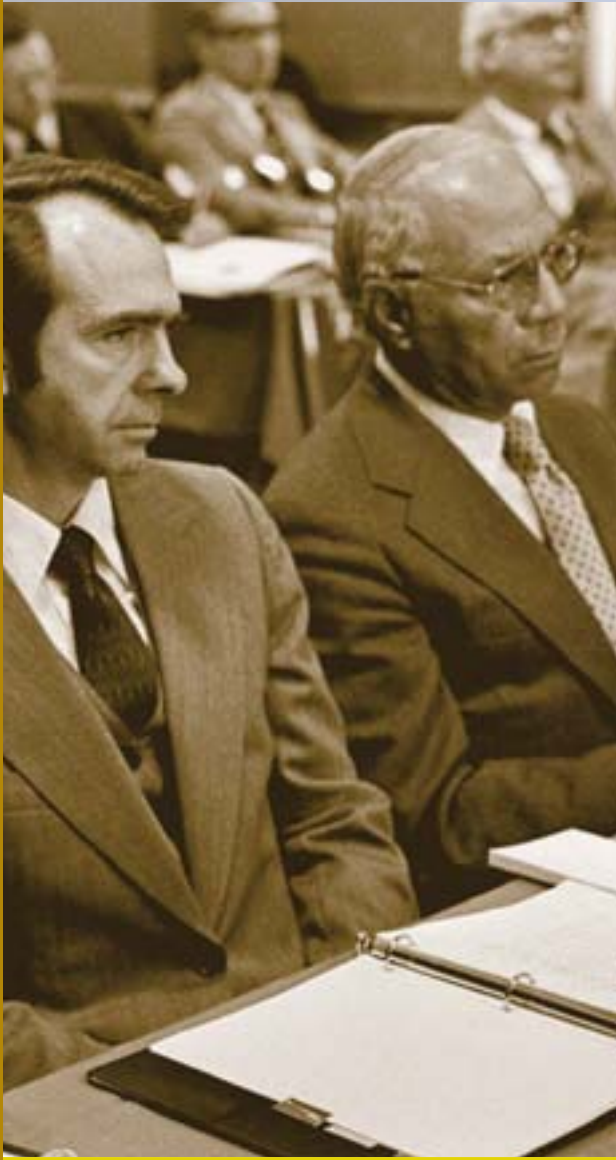
Senior Vice President, General Counsel, and Corporate Secretary



(above) Victoria F. Haynes, James J. Gibson, E. Wayne Holden, Lon E. Maggart, Satinder K. Sethi, Allen W. Mangel, Lorena K. Clark, G. Edward Story

(left) RTI's first president, George R. Herbert, led the institute from 1959 to 1989. He is shown here making a presentation to RTI's Board of Governors in November 1983.

RTI Board of Governors



Our governing structure comprises the members of the corporation, the board of governors, and the corporate officers.

The members of the corporation, representing Duke University and The University of North Carolina, meet annually as the nonprofit equivalent of stockholders. They elect the governors, who represent the business and scientific communities.

Our primary governing body is the board of governors, which formulates policy consistent with our mission to improve the human condition by turning knowledge into practice. The board meets at least every two months and consists of up to 15 governors who represent the University of North Carolina campuses, Duke University, and the business and scientific communities

Board of Governors

Earl Johnson Jr. (Chairman)

Chairman, Southern Industrial Constructors, Inc.

Thomas F. Darden

President and Chief Executive Officer, Cherokee Investment Partners, LLC

Victoria Franchetti Haynes

President and Chief Executive Officer, RTI International

Peter M. Lange

Provost, Duke University

William F. Little

Retired Senior Vice President and University Distinguished Professor of Chemistry, The University of North Carolina

Terri L. Lomax

Interim Vice Chancellor for Research and Graduate Studies, North Carolina State University

Harold L. Martin

Senior Vice President for Academic Affairs, UNC General Administration

William M. Moore Jr.

Partner, Franklin Street Partners, Inc.

H. Troy Nagle

*Professor and Founding Chair,
Joint Department of Biomedical
Engineering, University of North
Carolina at Chapel Hill and North
Carolina State University*

Paul J. Rizzo

*Chairman of the Board and
Partner, Franklin Street
Partners, Inc.*

Peter M. Scott III

*Chief Financial Officer, Retired,
Progress Energy*

James N. Siedow

*Vice Provost for Research, Duke
University*

Tony G. Waldrop

*Vice Chancellor for Research and
Economic Development, University
of North Carolina at Chapel Hill*

Phail Wynn Jr.

*Vice President, Durham and
Regional Affairs, Duke University*



(above) Earl Johnson Jr., Thomas F. Darden, Victoria Franchetti Haynes, Peter M. Lange, William F. Little, Terri L. Lomax, Harold L. Martin, William M. Moore Jr., H. Troy Nagle, Paul J. Rizzo, Peter M. Scott III, James N. Siedow, Tony G. Waldrop, Phail Wynn Jr.

(left) Joab Thomas and Albert Whiting attend an RTI Board of Governors meeting in November 1979.

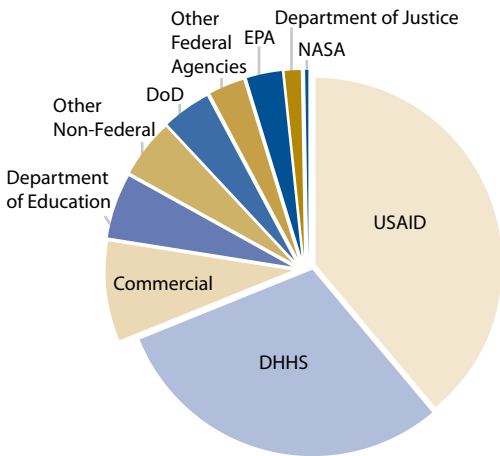
Financials



RTI International enjoyed its most successful business year to date, with annual revenue from contracts and grants totaling \$709.7 million for the fiscal year ending September 30, 2008 (an increase of nearly 16 percent over FY2007). RTI's financial position and outlook remain strong, with equity increasing to \$192.2 million as of September 30, 2008 (a 7.6 percent increase).

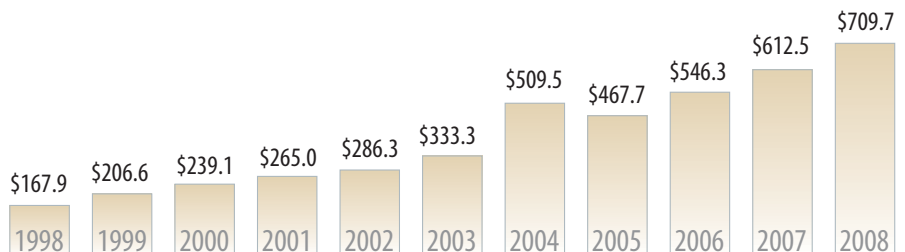
RTI's net revenue (revenue after expenses) totaled \$13.6 million. The lower net revenue this year is the result of increased strategic investments, as well as a decrease in the value of RTI's long-term investment portfolio, influenced by current financial market conditions. As a nonprofit corporation, RTI invests net revenue in facilities, programs, and capabilities to further our mission of conducting research that improves the human condition by turning knowledge into practice.

For the first time in our 50-year history, RTI issued tax-exempt revenue bonds to finance facility enhancements. A new \$28 million office building was financed with a municipal bond issued by RTI through Durham County, NC. In addition, bond proceeds were used to refinance a \$12.1 million outstanding debt on our recently constructed, state-of-the-art science and engineering laboratory building. As part of the due diligence process for the bond issuance, RTI was awarded a private AA- credit rating.



Source	Revenue	Percent
U.S. Agency for International Development	\$276,489,266	38.9%
Department of Health and Human Services	\$212,056,586	30.0%
Commercial	\$62,306,086	8.8%
Department of Education	\$39,308,034	5.5%
Other Non-Federal	\$36,392,379	5.1%
Department of Defense	\$29,516,627	4.1%
Other Federal Agencies	\$21,867,531	3.1%
Environmental Protection Agency	\$21,164,841	3.0%
Department of Justice	\$9,042,981	1.3%
NASA	\$1,567,555	0.2%
Total	\$709,711,886	100.0%

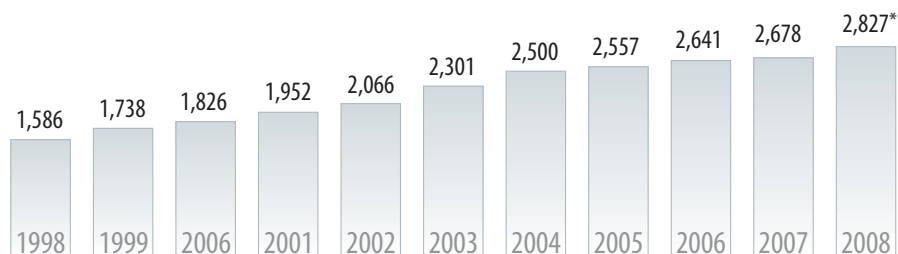
Revenue (in millions)





For the Year	FY 2008	FY 2007
Income Statement (in thousands of dollars)		
Revenue from research operations	\$709,712	\$612,487
Direct and indirect labor	(294,174)	(261,954)
Other direct costs	(304,576)	(252,552)
Other indirect costs	(86,431)	(72,345)
Other income (net of interest expense)	(10,946)	(144)
Effect of adoption of new accounting principle	0	(2,034)
Net Revenue	\$13,585	\$23,458
Balance Sheet (in thousands of dollars)		
Assets		
Current assets	\$250,286	\$200,649
Property and equipment, net	113,111	90,434
Other noncurrent assets	7,731	6,062
Total Assets	\$371,128	\$297,145
Liabilities and Institute Equity		
Current liabilities	\$167,542	\$111,673
Long-term liabilities	11,418	6,890
Total liabilities	178,960	118,563
Contributed equity (unrestricted)	5,061	5,061
Contributed equity (restricted)	1,804	2,023
Accumulated net revenue	185,303	171,499
Total Institute equity	192,168	178,582
Total Liabilities and Institute Equity	\$371,128	\$297,145

Staff



*In addition to our regular staff members, RTI employs about 1,400 term employees who support international projects in more than 40 countries around the world.

Client List



U.S. Government Clients

Department of Agriculture
Department of Commerce
Department of Defense
Department of Education
Department of Energy
Department of Health and Human Services
Administration for Children and Families
Agency for Healthcare Research and Quality
Agency for Toxic Substances and Disease Registry
Centers for Disease Control and Prevention
Centers for Medicare and Medicaid Services
Food and Drug Administration
Health Resources and Services Administration

National Institutes of Health
National Toxicology Program
Substance Abuse and Mental Health Services Administration
Department of Homeland Security
Department of Housing and Urban Development
Department of Justice
Department of Labor
Environmental Protection Agency
National Aeronautics and Space Administration
National Science Foundation
Office of National Drug Control Policy
U.S. Agency for International Development

Private Sector Clients

3M Company
Amgen
AstraZeneca
Bayer
Boehringer Ingelheim
Bristol-Myers Squibb Co.
Chevron Corporation
The CIIT Centers for Health Research
Dubai Biotechnology and Research Park
Elan Pharmaceuticals
Eli Lilly and Company
GlaxoSmithKline
Icagen, Inc.
Inspire Pharmaceuticals
The Johnson & Johnson Family of Companies
Merck & Co., Inc.
The Nielsen Company
Novartis

Pfizer
Range Fuels, Inc.
Roche Laboratories
Sanofi-Aventis
Schering-Plough
Syngenta Crop Protection
Teva Neuroscience, Inc.
ThromboGenics Inc.
Tioga Pharmaceuticals
U.S. News & World Report
Wyeth Pharmaceuticals

Other Clients

American Cancer Society
American Industrial Hygiene Association
American Legacy Foundation
Asian Development Bank
Bill & Melinda Gates Foundation
Ford Foundation
Global Alliance for TB Drug Development
The Hashemite Kingdom of Jordan
International AIDS Vaccine Initiative
International Partnership for Microbicides
King Hussein Institute for Cancer & Biotechnology
National Multiple Sclerosis Society
People's Republic of China
Republic of Mali
Robert Wood Johnson Foundation
Smith Family Foundation
U.K. Department for International Development
U.S. state governments
The World Bank
World Health Organization

Office Locations

Corporate Headquarters

Research Triangle Park

3040 Cornwallis Road
Post Office Box 12194
Research Triangle Park, NC 27709-2194
Phone: 919.541.6000
E-mail: listen@rti.org

Regional U.S. Offices

Ann Arbor

3005 Boardwalk Street, Suite 105
Ann Arbor, MI 48108-5218

Atlanta

Koger Center
Oxford Building, Suite 119
2951 Flowers Road South
Atlanta, GA 30341-5533

Chicago

230 West Monroe Street, Suite 2100
Chicago, IL 60606-4901

Rockville

6110 Executive Boulevard, Suite 902
Rockville, MD 20852-3907

San Francisco

114 Sansome Street, Suite 500
San Francisco, CA 94104-3812

Waltham

1440 Main Street, Suite 310
Waltham, MA 02451-1623

Washington, DC

701 13th Street, NW, Suite 750
Washington, DC 20005-3967

International Offices

Abu Dhabi, United Arab Emirates

Villa 82, Al Nahyan Camp
Sector 19/2, Muroor Road
PO Box 25805
Abu Dhabi, United Arab Emirates

Barcelona, Spain

Trav. Gracia 56, Atico 1
08006 Barcelona, Spain

Jakarta, Indonesia

Indonesia Stock Exchange Building
Tower 2, Suite 2302
Jl. Jend. Sudirman, Kav. 52-53
Jakarta 12190, Indonesia

Manchester, United Kingdom

Williams House
Manchester Science Park
Lloyd Street North
Manchester, M15 6SE, United Kingdom

Pretoria, South Africa

1st Floor, 121 Mucklenuck Street
Nieuw Muckleneuck
Pretoria, South Africa

San Salvador, El Salvador

Torre Anexa Radisson Local B
87 Avenida Norte entre 13 y 15 Calle Poniente
Colonia Escalón
San Salvador, El Salvador

Subsidiaries

Ottawa, Canada

RTI Health Solutions, Inc.
220 Laurier Avenue West, Suite 350
Ottawa, Ontario, K1P 5Z9 Canada

Warsaw, Poland

RTI Polska Sp. z o.o.
Ul. Walecznych 19/7
03-916 Warszawa, Poland

www.rti.org



RTI International is one of the world's leading research institutes, dedicated to improving the human condition by turning knowledge into practice. Our more than 4,200 professionals provide research and technical services to governments and businesses in more than 40 countries in the areas of health and pharmaceuticals, education and training, surveys and statistics, advanced technology, international development, economic and social policy, energy, and the environment. For more information, visit www.rti.org.

RTI International is a trade name of Research Triangle Institute.



Mixed Sources
Product group from well-managed
forests, controlled sources and
recycled wood or fiber
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