

TO: RIT Board of Trustees, Administration, and Faculty
FROM: Marjorie K. Zack, Director *MK*
DATE: June 25, 2004
RE: Annual Report for FY04

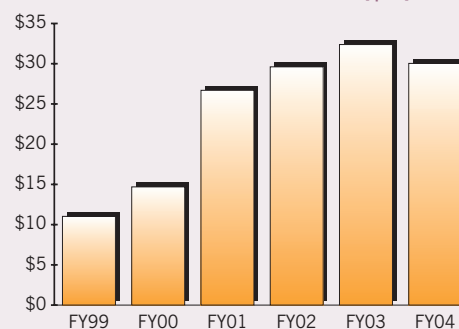
As of this writing, fiscal year 2004 saw a 5% increase in the number of proposal writers and a corresponding 5% increase in the number of proposals submitted, but a 7% decline in the total value of awarded grants and contracts. The number of projects awarded increased by 15%, with the average value of funded projects at \$38,857, somewhat less than last year's average of \$48,117. We passed the 1,000 mark for the first time: one hundred ninety-four faculty and staff wrote 1,013 proposals, showing that we continue to engage more people each year in seeking external funding. While \$30,036,803 in awards is less than last year's \$32,382,797, with \$39 million in proposals still pending, we expect quite a few awards to be announced later this summer. As we execute agreements for awarded projects, we will update these figures; if you would like a copy of our final report in September, please send an email to research@rit.edu.

We have been monitoring federal funding trends and are concerned about what we see on the horizon. Funding at key agencies - the National Science Foundation (NSF), the Office of Naval Research, and the US Department of Education will grow next fiscal year by only ~3% and then will either remain steady or slightly decline in FY06. In the President's framework for the FY06 budget, funding for research and development will go down in all agencies, including Homeland Security. Meeting the mark for competitively reviewed grants is already very tough, and it will get tougher next year and beyond. NSF, for instance, awarded 30% of proposals submitted last year. This year, they expect to award only 25% and even fewer in FY05.

For RIT, these trends reinforce our need to continue writing high-quality proposals and to stay keenly attuned to national trends, positioning cutting-edge projects as models for others to adapt. We must also increasingly involve our students in research, both at the undergraduate and graduate levels, as federal agencies look to us to educate the next generation of scientists and engineers who will become leaders themselves in the national research enterprise.

This report introduces you to some of our students who are engaged with faculty on research projects. One hundred twenty-five graduate students worked with faculty on projects this year; a sampling is featured on pages two and three. Faculty investigators are role models for our students and for other faculty who desire outside funding to hone and disseminate their scholarship, whether it be pedagogical scholarship or that of discovery, integration, or application. Leaders among our faculty who have been acknowledged outside of RIT are featured on page four. Several members of the RIT community are being tapped by funding agencies to serve on peer-review panels, which both builds their relationship with that sponsor and teaches them about the review process and the sponsor's funding criteria. We can parlay their lessons learned into successful competition nationally, which will become increasingly important for RIT as overall external funding becomes more scarce.

VALUE OF PROPOSALS FUNDED (\$M)



AWARDS BY COLLEGE/DIVISION

Division	Awarded	% of Total
University-wide Units*	\$7,342,372	24%
College of Science	\$7,180,812	24%
National Technical Institute for the Deaf	\$6,388,206	21%
Kate Gleason College of Engineering	\$2,962,083	10%
College of Imaging Arts & Sciences	\$2,534,143	8%
Center for Integrated Manufacturing Studies	\$1,797,674	6%
B. Thomas Golisano College of Computing & Information Sciences	\$ 830,090	3%
College of Liberal Arts	\$ 620,377	2%
College of Applied Science & Technology	\$ 374,096	1%
Other	\$ 6,950	<1%

* University-wide units include: Wallace Library, Online Learning, K-12 Partnerships, Outreach, other Academic Affairs, Student Affairs, Enrollment Management & Career Services, and Finance and Administration

PURPOSES AND SOURCES OF FUNDING

Purpose	Awarded	% of Total
Research	\$13,638,633	45%
Equipment & Facilities	\$ 6,038,513	20%
Service & Evaluation	\$ 3,193,774	11%
Training	\$ 2,522,547	8%
Outreach	\$ 2,020,285	7%
Curriculum Development	\$ 1,669,181	6%
Student Support	\$ 953,870	3%

Source	Awarded	% of Total
Federal	\$15,190,958	50%
NY State	\$ 8,313,213	28%
Corporate	\$ 4,794,568	16%
Foundation	\$ 1,344,978	4%
Other	\$ 606,805	1%



The Doctors are In
Mustafa Abushagur stands with the newest class of
 Microsystems Science and Engineering PhD students, many
 of whom receive tuition and/or stipend support under active
 grants.

Back row (L to R): Steven Ciccarelli, Cory Cress, Joseph DeGroot
 and Andrew Estroff; Middle row: Sripriya Rachaiah, Brian Landi,
 Ajay Pasupuleti, Jeffery Perry and Yongfa Fan; Front row: Mark
 Steinke, Jianming Zhou, Dr. Mustafa AG Abushagur, Wai Keat Kuan,
 Dale Ewbank and Stephen Sudirgo

RESEARCH, SCHOLARSHIP, AND CREATIVE ACTIVITIES

On these pages, we highlight just a few of the ways that outside funding has advanced RIT's core missions in Fiscal Year 2004, beginning with sponsored projects that integrate research with education.



In the Eye of the Beholder

Jiangtao "Willy" Kuang is a second-year PhD student in the Munsell Color Science Laboratory, Chester F. Carlson Center for Imaging Science, College of Science. Under the direction of his PhD advisor, **Mark Fairchild**, Willy studies color imaging. Willy's current research incorporates human visual system characteristics and digital image processing techniques to develop High Dynamic Range algorithms, enabling more reliable and preferable image reproduction in digital photography. Willy will

continue his research, making the world more beautiful with new imaging techniques.

Keeping Their Cool

Satish Kandlikar (right) explains heat transfer in a micro-channel to **David Hein**, a fourth-year Mechanical Engineering student studying in the Air Force ROTC program. David is working this summer with Dr. Kandlikar, Gleason Professor of Mechanical Engineering, with funding from the NSF Research Experiences for Undergraduates program to explore critical heat flux modeling in cooling application for high-performance computer chips.



Connecting the Dots
Brian Landi, a third-year PhD student in Microsystems Engineering, conducts research in the NanoPower Research Laboratories in the College of Science under the guidance of professor **Ryne Raffaele**. His

work focuses on synthesis and characterization of nano-materials, such as single wall carbon nanotubes (SWNTs) and quantum dots, which are being investigated as viable dopants for polymeric solar cells. This work is a continuation of his internship at the NASA Glenn Research Center during the summer of 2003 where he developed novel reaction schemes to attach quantum dots to SWNTs. Based on this success, NASA awarded him a prestigious NASA Graduate Student Fellowship to support a continued collaboration with NASA Glenn on nanomaterial-polymeric solar cells. Brian's long-term career goals may lead to nano-material research for government or industry.

Using Viruses to Heal

Assistant professor **Maureen Ferran's** Biology Laboratory hosted undergraduate **Warren Hammond** (class of 2004) during the past two years. Warren's research focused on understanding virus-host interactions using Vesicular Stomatitis Virus (VSV). VSV holds the unique potential to treat certain cancers. To implement such a treatment, a complete understanding of the nature of the virus and all its interactions with a host are needed. Data gathered in Ferran's lab will shed light on how, at a molecular level, VSV may be able to one day destroy cancerous cells, while leaving normal and healthy cells alone. Warren will be attending Baylor College of Medicine this fall working towards a PhD in Molecular Virology. Ferran's research has been funded by her department and college and most recently by a newly awarded three-year National Institutes of Health Academic Research Enhancement Award.



Martian Balloons
Aimee Lemieux (left), a fifth-year BS/MS student in Mechanical Engineering, reviews modeling dynamics on a balloon for a NASA space mission with **Jeffrey Kozak** (center) and **Elizabeth**

DeBartolo (right), both assistant professors in Mechanical Engineering. Aimee's thesis grew out of a co-op at NASA-Goddard (Wallops Island Flight Facility) completed in 2003. Aimee is now conducting design, analysis, and testing for a balloon to be used in dropping the rover vehicle on an upcoming Mars mission. Aimee is completing a second co-op this summer at NASA Goddard and will continue this work at RIT when she returns in the fall. Aimee plans to work at NASA after graduation next spring.

Unleaded Electronics

Professor **S. Manian Ramkumar's** graduate students have been an important part of his research work in the Center for Electronic Manufacturing and Assembly. Together they worked this year with Redcom Laboratories Inc. of Victor, NY. **Karthik Thenalur** (below, left) led an effort to research the problem behind a number of field failures in one of Redcom's Integrated Circuit packages. His failure analysis led to successful prevention efforts and better quality controls for one of Redcom's key suppliers.

Manivannan Sampathkumar (center) and **Santhakumar Rajesnayagam** (right) prepared a compendium of research into lead-free production technologies. Electronics manufacturers and related industries have to implement lead-free production by July 2006 in order to export to the European Union.



Crime Fighters

John Klofas, professor of Criminal Justice, works closely with two graduate students in RIT's new Public Policy program in the College of Liberal Arts. **Chris Delaney** and **Tisha Smith** are working toward MS degrees while serving as researchers on Project Safe Neighborhoods and on the Strategic Approaches to Community Safety Initiative, both funded by the US Department of Justice. Chris, Tisha, and Professor Klofas have produced nearly twenty working papers about various aspects of crime, victimization, and community safety in the City of Rochester. They have made numerous presentations to community groups, public officials, and the media.





Soft Science

Two departments in Golisano and Gleason Colleges are working together to create curricula on real-time and embedded systems. **Jim Vallino** (Software Engineering) and **Roy Czernikowski** (Computer Engineering) received NSF funding to create two courses and disseminate them to other colleges and universities. Underway since last summer and concluding in June 2005, their project includes their meeting with the two universities whose models they are following (Arizona State University and Southern Polytechnic State University), creating and offering both courses several times at RIT, meeting with industries who likely will hire our graduates, and presenting the curricula and its impact to other university faculty at professional meetings. Later this summer, Vallino will sit on a NSF board as a peer reviewer for new proposals for funding; his work at RIT provides a great foundation for what can be accomplished with grant funding for curricular innovations.

(Left to Right) Ray Saltrelli, Dr. James Vallino, Eric Nelson, Gregory Giacobelli, Dr. Roy Czernikowski, Gregrian Vassell (not pictured)



Interpreting Mixed Signals

P.R. Mukund, professor of Electrical Engineering and director of the RF/Analog/Mixed-Signal Lab (RAMLAB) directs several research projects in the field of RF integrated circuit design, currently funded by the NSF, Semiconductor Research Corporation, Harris RF Corporation, LSI Logic, and NYSTAR. The work, an integrated part of the Microsystems Engineering PhD program, supports three students. Research is aided by **Clyde Washburn**, distinguished researcher in the RAMLAB, who has extensive industrial experience.

(Left to Right) Anand Gopalan, PhD student; Simo Bentmansour, BS/MS student; Professor P.R. Mukund; Tejasvi Das, MS student; Ghanshyam Nayak, PhD student; Sripriya Bandi, PhD student; Clyde Washburn, distinguished researcher. All students are funded under Professor Mukund's research efforts.



Mentored Microengineering

Bruce Smith, Intel Professor of Microelectronic Engineering and director of the Center for Nanolithography Research, oversees the research of **Neal Lafferty**, a first-year PhD Microsystems Engineering student in the Kate Gleason College of Engineering who is serving a ten-month internship at the *Interuniversity MicroElectronics Center* (IMEC) in Belgium, supported by Mentor Graphics. Neal is working in the lithography group in the IMEC Silicon Process and Device Technology division, concentrating on optical extension technology. His project specifically examines applications of optical microlithography to device technology beyond 100nm nodes. Such applications continue to be more viable than alternative approaches. This project provides an invaluable international hands-on research experience for Neal and establishes groundwork for further collaboration among RIT, IMEC, and Mentor Graphics.

Solving for X

NTID professor **Ronald Kelly** received two grants from the US Department of Education for *Project Solve*, a web-based problem-solving resource for deaf, hard of hearing, and other language-challenged learners. Available 24 hours a day, the website's (<http://problemsolve.rit.edu>) instructional sequence takes students from dependent learning of problem-solving strategies to independent application of those strategies. While students work through the problems, the RIT research team is able to capture data that show where problems arise for these students.



Professor Kelly has also just received a significant NSF Science of Learning Center catalyst award that lays the foundation for a future center focusing on the interrelationships among mathematics, language, and cognition in the learning process. *Mathematics for Deaf and Hard-of-Hearing Learners* involves collaboration with Gallaudet University and Bowling Green State University on proof-of-concept research, partnership-building, and planning for educational outreach.



Prehistoric Farming

Andrew Moore, dean of the College of Liberal Arts and professor of Anthropology, has received funding from the National Geographic Society and the National Science Foundation to support archaeological research in Croatia. His two projects, which entail further excavation and analysis at the Neolithic site of Danilo, explore the origins and spread of farming in Europe. Work will be carried out over the next three summers and involve American and Croatian students in field work.

Self-Taught Environmentalism

John Morelli, associate professor of Civil Engineering Technology in CAST, was awarded a small grant from the State of New York to prepare a self-teaching guide to help small- and medium-sized companies and other organizations prepare strategic environmental systems. The guide, published in book and CD-ROM formats, will lead organizations through a step-by-step process to develop and implement a customized system and will include forms and other resources.



Map for Manufacturers

The US Department of Commerce and its Economic Development Administration (EDA) awarded funding to address ways to support the manufacturing industry in Upstate New York. **Nabil Nasr**, assistant provost and director of the Center for Integrated Manufacturing Studies (CIMS) is leading this project, which will result in a strategy aimed at bolstering the manufacturing jobs that are so important to the New York State economy. CIMS will gather market research data on the needs, problems, and barriers facing manufacturers today and will formulate action plans to address those needs. The second phase, which we hope will be funded with a follow-up grant, will implement these solutions with individual businesses.



HEALTHY COMPETITION

For many years the National Institutes of Health (NIH) has made a special effort to stimulate research in educational institutions that provide baccalaureate training but which are not traditionally recipients of significant NIH support. The Academic Research Enhancement Award (AREA) supports individual behavioral and biomedical research projects that involve undergraduate students. RIT received three NIH-funded AREA grants this year, an Institute record.

Suzanne O'Handley joined RIT in the summer of 2003 as an assistant professor of Chemistry. Dr. O'Handley's research focuses on the discovery and characterization of new enzyme families. This work will help to annotate the growing body of data from genome sequencing projects. Discovering and characterizing new enzymes as potential novel antibiotic targets will contribute to a better understanding of how enzymes recognize their substrates, which may in turn lead to better drug design. Three to six undergraduate student researchers work on this NIH-funded project during the year.

Maureen Ferran, assistant professor in Biology, was awarded an AREA grant in the spring of 2004. Ferran's long-term research goal is to understand how vesicular stomatitis virus (VSV) regulates interferon (IFN) gene expression in infected cells. Detailed knowledge of this complicated cellular response could lead to the development of new antiviral and anticancer therapies. Ferran's lab is home to four to six undergraduate student researchers each year.

In her first NIH funded grant at RIT, **Hyla Sweet**, assistant professor in Biology, will study mesoderm development in a primitive sea urchin with her undergraduate students. Dr. Sweet provides research opportunities for four to six undergraduate students in her lab.

MEET THE ENTERPRISE CENTERS

While the term "Enterprise Centers" may be new at RIT, the units themselves are no strangers to the world of sponsored projects. Enterprise Centers, units within RIT colleges, perform an impressive array of evaluation, service, and training activities primarily on a fee basis to corporate and other sponsors worldwide. Accounting for almost 75% of the proposals processed by Sponsored Research Services (SRS) last year and 10% of total sponsor dollars, these units are critical parts of the research enterprise, as well as key agents of RIT's core missions.

Enterprise Centers provide numerous student employment and co-op experiences, allow faculty the opportunity to train and work with industry partners and to disseminate the results of their work, and provide services that contribute to RIT's uniqueness and reputation while leveraging our expertise and research resources.

Last December, with efficiencies afforded by a new database, SRS upgraded an existing clerical position to an administrative post. Our new research administrator, **Anthony Capobianco**, is responsible for providing value-added service to the Enterprise Centers, which currently include:

- Integrated Plastics and Packaging Science Laboratories in CAST
- Image Permanence Institute, Industrial Education Programs, and Printing Applications Laboratory in CIAS
- Center for Excellence in Lean Enterprise, Imaging Products Laboratory, Occupational Safety and Ergonomics Excellence unit, and the Training and Marketing program in CIMS
- John D. Hromi Center for Quality and Applied Statistics in KGCOE

NEW YORK STATE & FEDERAL GOVERNMENT APPROPRIATIONS

Deborah Stendardi, vice president for Government and Community Relations, works with state and federal legislators to secure funding for key projects at RIT, including research programs and capital facilities. During this past year, New York State provided support for the Center for Biotechnology Education and Training through the Senate's Gen*NY*sis program and the Assembly's RESTORE NY program for a total of \$6 million with an additional \$2 million expected next year as the facility is built. We also have commitments for \$450,000 for work with the manufacturing industry, both for our roadmap study for New York manufacturing and for manufacturing outreach; both will count in next year's awards. New York State (NYS) continued its support for interpreter training (\$100,000) and next year will provide an additional \$70,000 in support. NYS also targeted support for special projects, including an environmental management system teaching guide (\$15,000), the RIT student ambulance (\$10,000) and the Scholastic Art Awards Program (\$10,000).

From the federal government, we received two major awards. The US Department of Education designated \$419,000 for training workers for new careers in biotechnology. NASA awarded \$1,341,000 to RIT for phase two of the *Wildfires Airborne Sensor Program* demonstration project for the Center for Imaging Science's remote sensing group. Other awards are committed and will be received in next fiscal year, including \$2 million for our *Defense Modernization and Sustainment* program in the Center for Integrated Manufacturing Studies and \$1.5 million for continuing work with NASA on an imaging science research program called *Integrated Sensing Systems Initiative*.

COMPLIANCE AND ITS COSTS

Compliance is an important concept in the world of grants and contracts. We comply with federal laws and regulations, set and managed by various agencies. Financial rules, for example, are published and managed by the Office of Management and Budget; human subjects research is administered by the Department of Health and Human Services; export control and conflict of interest are administered by various government agencies depending on the subject matter or sponsorship; and so forth. Compliance requires following federal and state laws, requirements of individual sponsors, and RIT policies and procedures. Balancing all of these sometimes-conflicting requirements is a challenge for the research community, one that is shared at RIT by many offices, including colleges and departments, the controller's office, Risk Management & Safety Services, Sponsored Programs Financial Management Services, and Sponsored Research Services (SRS).

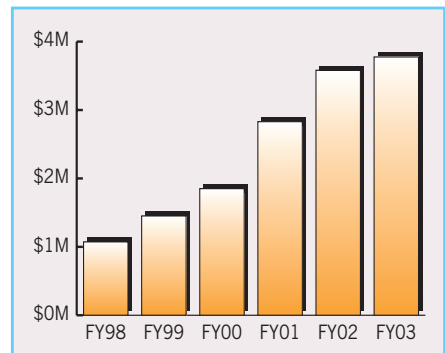
Within SRS, we made changes this year to ensure RIT's compliance in areas that had previously been underserved. **Julie White**, our new Senior Research Administrator for NTID, Student Affairs, and other units, will additionally assume the position of director of the Human Subjects Research office. She will be RIT's first designated director; the administrative work of the two Institutional Review Boards (IRBs) that oversee human subjects research had previously been performed by SRS staff who fit this job around their other full-time responsibilities. Since SRS began administering the two IRBs in 2001, the number of projects reviewed annually has grown nearly 300% from 40 to 112. More faculty and students are now meeting regulatory and policy requirements by seeking IRB review, which in turn means that RIT is doing a better job of protecting both our researchers as well as the people who participate in our research projects.

Prior to 9/11, most universities did not actively review projects to ensure compliance with federal export control laws. Since that fateful day, the passing of the Patriot Act, and new federal scrutiny of university research practices, we have learned more about the necessity for compliance in this area. SRS held a workshop last October to educate deans, department heads, and key faculty about export control matters and we are chairing a university task force to facilitate communication and to support various offices' efforts to comply with federal law. This summer, we began reviewing key research programs to understand implications of export control at RIT. When needed, SRS will work with Provost McKenzie, RIT's Designated Official for the State Department's export control office, to seek licenses for the provision of technical assistance, data, or technology overseas or to foreign nationals in the US.

The cost of complying is a subject of great interest and concern to universities. In March, the Council on Governmental Relations (COGR) published a report about the cost of compliance with federal regulations not recovered with grant funding. Each university has an administrative cost limit of 26% that it can recover under each grant. Twenty research-intensive universities studied by COGR reported an annual average of \$2.4 million of under-recovered costs. RIT in its last study (FY02) spent 5.17% more than what was allowed within the 26% administrative cap at a cost of \$200,000. As more compliance requires greater oversight and active management and as our research efforts grow, this under-recovery will unfortunately also grow unless there is a change at the federal level of this 26% limit on administrative expenses.

FACILITIES AND ADMINISTRATIVE COSTS RECOVERY

Each year externally funded grants and contracts return funds to the university in the form of a recovery of facilities and administrative expenses. The facilities and administrative cost rates are calculated using a formula that RIT negotiates with the Department of Health and Human Services. For FY03, RIT calculated \$3,775,755 in facilities and administrative costs for sponsored projects and their associated cost-share accounts.



CAMPUS LEADERSHIP

Except for most projects from corporations and government appropriations, awarded projects are "won" by faculty whose work is reviewed by panels of their peers. Panel members represent the best in the nation within a particular field, considered by a sponsor as qualified to evaluate the value and promise of proposal submissions. Increasingly, RIT faculty and professional staff who have gained recognition as experts are being invited to join such panels. In one case this year, RIT hosted an entire panel review for the US Department of Education FIPSE (Fund for the Improvement of Postsecondary Education), which afforded nearly 20 faculty from RIT and other Upstate universities the experience of reviewing proposals for funding.

The National Science Foundation (NSF) tapped Dean **Diaz-Herrera** from the Golisano College to serve both on a panel and on a site committee that visited three finalists. IT department head **Jim Leone** just returned from Washington where he reviewed applications in a NSF sensors and sensor networks competition, and was invited to join a panel to review for NSF's PhD fellowship program. **Nabil Nasr**, assistant provost and director of CIMS, participated on a review panel at NSF for the Design, Manufacturing and Industrial Innovation division. In engineering, **Sergey Lyshevski** and **Paul Petersen** both reviewed for NSF's nanotechnology initiative in the nanoscience engineering/science and the nanotechnology education programs, respectively. **Greg Semeraro**, a new faculty member in Computer Engineering, reviewed for NSF's computer clusters program. **Cindy Gary** (Sponsored Research Services) and **Jim Anderson** (CIMS) sat on a NSF panel for the Partnerships for Innovation program, which in past years funded RIT's *Upstate Alliance for Innovation*. Nearly all of the major federal sponsors called upon experts from RIT: **Donna Lange** (NTID) reviewed Advanced Technology Education projects at NSF; **Ryne Raffaele** (physics) reviewed proposals for NASA, NSF, FIPSE, and the US Department of Energy; and **Julie White** reviewed for the Department of Justice in last year's program to reduce violent crimes against women.

Faculty demonstrated leadership in other ways. **PR Mukund**, professor of Electrical Engineering, was one of four faculty whom NSF asked to help plan the next NSF/SRC (Semiconductor Research Corporation) solicitation. He has been running one of these joint projects, which NSF considers exemplary. NSF asked **Nabil Nasr** to participate in a program-planning group for *Environmentally Benign Systems Engineering*; RIT joined North Carolina State University and Georgia Tech in this planning initiative.

Two years ago, Sponsored Research Services established the *PI Institute*, a series of seminars covering seeking and managing grants from idea to publication. This year we added *PI Workshops*, in-depth two-hour seminars targeting specific topics. This year's topics included the role of department heads in the research enterprise; the political, legal, and compliance aspects of export control; and a detailed exploration of setting up and sticking to a project budget. Since inception of the *PI Institute* and *PI Workshop*, 330 faculty and staff have attended these events, which were presented by 52 funded faculty. Faculty such as these presenters provide important on-campus leadership. We plan to extend this leadership role next year into a new program called *PI Mentors*. Ten senior faculty will be asked to mentor new or unfunded faculty who desire to engage in the sponsored funding process. *PI Mentors* will be RIT's newest agents for academic leadership.

Sponsored Research Services calculated this year's participation amongst eligible investigators and found that overall 32% are involved as either leaders or co-leaders on proposals. This is a fabulous record, topped by the Gleason College where 62% of likely investigators submitted proposals. We will continue monitoring this participation rate and elaborate on it in future issues of our annual report.

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