To the Case Western Reserve Community:

Ask someone how to fix a scratch on a car and the answer usually involves some combination of sanding and painting. Who would have thought simply shining a light on the spot could make the damage disappear?

Engineering professor Stuart Rowan and his team—that’s who.

“Think Beyond the Possible” is more than a catchy tagline on our campus. It actually describes what we do here. In the pages that follow, you’ll see how people throughout the university brought those words to life throughout the 2010–2011 academic year.

Our law students won a million-dollar verdict. Our chemistry faculty discovered that gold nanoparticles could accelerate cancer treatment. And a medical student found that eating foods labeled “trans-fat free” still can set you over the recommended daily limit. Who would have thought?

Our community is full of people passionate about finding answers and deepening understanding. They stretch boundaries, create breakthroughs and help us see what appears invisible to others. How? They query, they clarify and, most of all, they demonstrate extraordinary ingenuity and insight. All of that happens here? Absolutely. Who would have thought?

We did. And do. Every day.

Take a look. And take pride in all that can happen when a community comes together in pursuit of a common mission.

Barbara R. Snyder, President
WHO WOULD HAVE THOUGHT...

The world doesn’t float in a sea of ether.
Hand washing can stem infections.
Cholesterol contributes to heart disease.

Obvious, right? Not at the time.
These ideas only became commonplace after faculty at Case Western Reserve University pushed beyond accepted wisdom to give rise to new knowledge. For nearly two centuries, we have made breakthroughs, challenged the status quo and searched for fresh perspectives and new truths.
As you will see in the pages that follow, we continued that tradition in 2010–2011. See here—and online—just how much our bold approach helps shape what everyone thinks.

case.edu/whowouldhavethought
Whether it’s from the bump of a wayward shopping cart or the key of an angry passer-by, scratches to your car’s paint job are practically inevitable.

But such dings may soon have a bright side, thanks to a self-healing polymer developed by macromolecular scientist and engineer Stuart Rowan, PhD, who found an unusual way to make scratches disappear—with just a flash of light.

Rowan created a compound different than conventional polymers, which consist of long, chain-like molecules. Rowan’s material is composed of smaller molecules assembled into longer chains, using metal ions as “molecular glue.”

Thirty seconds under intense UV light can make scratches a memory, as the light causes the polymer structures to become temporarily unglued, transforming the originally solid material into a liquid that flows easily. When the light is switched off, the material reassembles and solidifies again, restoring its original properties.

Rowan and his team are refining the coating for commercial applications and hope it may one day save not only your car, but perhaps your furniture and floors as well.
Bed rest might do more harm than good for some moms-to-be.

A prescription for rest may be anything but relaxing for more than 1 million pregnant women every year. Complications ranging from early contractions to high blood pressure to bleeding could prompt a doctor to put expectant mothers on bed rest—a recommendation that can vary from telling her to “take it easy” to advising her to stay confined to a bed or couch for most or all of every day.

Nursing researcher Judith Maloni, PhD, RN, took a closer look at what happens physically and mentally to moms-to-be when they’re ordered on bed rest. Her findings may surprise mothers and doctors alike. Bed rest frequently can lead to anxiety as the expectant mother worries over every contraction, Maloni found. The strictest bed rest guidelines—when she is confined to bed for nearly 24 hours a day—also can lead to bone loss and muscle atrophy, Maloni says.

What’s more, such confining conditions can bring on depression in some women, and mothers on bed rest often face relationship conflicts with partners and other family members who must serve as her caretakers.

Maloni hopes her findings can help women and their doctors make more informed decisions about risks when prescribing bed rest for pregnancy complications.
Decoding the meanings behind teens’ text messages is even trickier than you may have thought. Hidden behind the multitude of LOLs and BRBs, the TTYLs and <3s, is a message that is sure to make parents :-(

Scott Frank, MD, a family physician and public-health researcher, wondered what we might learn from teenagers’ busy thumbs.

It turns out that teens who send more than 120 text messages per school day—what he calls hypertexters—are more likely to engage in a variety of risky behaviors as compared with their more moderate peers. After controlling for such factors as race, gender and household structure, these ultra-social teens are 43 percent more likely to smoke cigarettes; twice as likely to have tried alcohol; 41 percent more likely to have tried illicit drugs; and three-and-a-half times more likely to have had sex, among other unhealthy behaviors. Almost 20 percent of the teens Frank surveyed were identified as hypertexters.

He found similar results among hyper-networkers—teens who log more than three hours per school day on social networking sites like Facebook and Twitter. About 11 percent of the teens Frank studied were considered hyper-networkers.

The correlation sends a message to parents and pediatricians: Talk with your teens about their tech habits.
Dental researchers help unearth secrets of evolution.

The words “fossil excavation” are likely to conjure up images of Indiana Jones-style adventurers snooping around caves in the middle of a desert, wearing big hats and dusting off ancient remains with little brushes.

Images of a dentist in the throes of such an endeavor might not readily come to mind, but perhaps they should, says dental researcher Mark Hans, DDS, who joined an excavation team in Israel this year to help shed light on how the human head has evolved over time.

The site—a prehistoric Israeli cave discovered in 2010—houses remains of human ancestors who lived between 30,000 and 20,000 years ago and is the largest and potentially one of the most important archeological sites in Israel. Hans is helping to analyze teeth and parts of a skull previously found at the site. Expert dental examination of fossil remains from this era can help settle a dispute about the formation of the human chin—whether it became more prominent as our teeth recessed or if it is an entity that evolved on its own over time.

A wealth of fossils are likely still waiting to be unearthed at the cave, so Hans is making arrangements to have Case Western Reserve dental medicine students join the dig and subsequent analysis in future years.
Law students win landmark verdict in fraud case.

Falling victim to fraud can have dire consequences for a family and the surrounding community. But standing up against such a scheme can be an empowering and rewarding endeavor—not to mention a career-launching moment for future lawyers.

Such a case was taken on by the university’s Milton A. Kramer Law Clinic, and the outcome was better than anyone would have imagined.

A local family turned to students at the clinic and their faculty supervisor, Andrew Pollis, JD, to restore justice after they fell victim to a fraudulent home-repair and financing scheme. The students tried the case before a jury, making it one of the few civil cases the clinic has seen that went to a full-blown trial. The family won a $1.12 million verdict—$9,000 more than the legal team had even asked for. It was the largest award in the clinic’s history and included compensatory damages, treble damages under the Ohio Consumer Sales Practices Act and punitive damages. In addition, the trial judge tacked on $50,000 in legal fees.

The case proceeded for three years, and several Case Western Reserve law students contributed throughout the process. Third-year students Brant DiChiera and Jennifer Hadley represented the clients during the trial.
A gold nanoparticle is less than 1/10,000 the width of human hair—hardly the makings of a fine necklace or earrings. To those with cancer, however, the nanoparticles are proving to be far more precious than any jewelry.

Injected alone, anti-cancer drugs can take days to gather and attack a tumor, but chemist Clemens Burda, PhD, added a spark to the process by introducing gold to standard treatments. His work shows that an anti-cancer drug loosely attached to gold nanoparticles can home in on tumors and be activated for effective treatment within two hours. This speedier method enables patients to receive lower doses of the toxic chemicals, thereby saving healthy tissue from damage and other harsh side effects suffered in traditional chemotherapy.

The lipid membranes of cancer cells draw the drug away from the gold. An external laser light switches on the photodynamic therapy drug silicon phthalocyanine, which breaks down and kills cancer cells, thereby shrinking the tumor. After delivering the drug, the gold particles pass through the kidneys and clear the body within a week.

Burda’s promising initial results have led to additional grant funding to continue the treatment’s development toward a clinical trial.
HOME IS WHERE THE ART IS

Urban art therapy helps heal wounds.

If a single picture is worth a thousand words, then how valuable could a community-wide art project be? Richey Pipirinen, an expert in urban poverty and redevelopment, asked just that question and found the answer in a neighborhood rocked by devastation.

In January 2010, more than 50 homes and surrounding buildings in Cleveland’s Detroit Shoreway neighborhood were damaged or destroyed in a natural gas explosion. The disaster resulted in further vacancies in an already disenfranchised area.

Pipirinen found a way to help community members heal from such loss by using visual and experiential art to get residents talking about issues of abandonment and loss. His W. 83rd St. Project turned a condemned home into an art installation that encouraged residents to think about their experiences before, during and after the explosion, and share their stories and feelings with their neighbors and community leaders.

This spring, the home will be deconstructed and reused to make tables and benches, and create a reading garden for local residents to enjoy. It will serve as a reminder that positive transformation can emerge even in the face of adversity.
WHEN IT COMES TO NUTRITION LABELS, SHOPPERS GENERALLY FALL INTO ONE OF TWO CAMPS: THOSE WHO READ THEM, AND THOSE WHO WOULD RATHER NOT KNOW. RECENTLY, A THIRD CATEGORY CAME TO LIGHT: THOSE WHO, DESPITE READING LABELS, STILL MIGHT NOT KNOW WHAT THEY’RE REALLY EATING.

CURRENT REGULATIONS FROM THE FOOD AND DRUG ADMINISTRATION ALLOW FOR LESS THAN COMPLETELY ACCURATE LABELING WHEN IT COMES TO TRANS FATS, THE DANGEROUS DIET-BUSTERS THAT HAVE BEEN LINKED TO ELEVATED CHOLESTEROL AND AN INCREASED RISK OF CORONARY ARTERY DISEASE, SUDDEN CARDIAC DEATH AND POSSIBLY DIABETES.

THIS UNDERSTANDING LED MEDICAL STUDENT ERIC BRANDT TO ASK, HOW MANY TRANS FATS ARE FLYING UNDER THE RADAR AND STEALTHILY RUINING OUR DIETS?

FOOD COMPANIES ARE ALLOWED TO ROUND DOWN WHEN REPORTING TRACE AMOUNTS OF TRANS FAT, TOUTING FOODS CONTAINING LESS THAN 0.5 GRAMS AS TRANS-FAT-FREE.

BRANDT DISCOVERED THAT CONSUMERS CAN EASILY EXCEED THE DAILY RECOMMENDED VALUE OF 1.11 GRAMS, DESPITE THEIR BEST EFFORTS. JUST THREE ServINGS OF DECEPTIVELY LABELED FOODS WITH 0.49 GRAMS EACH OF TRANS FAT PUT A CONSUMER OVER THE RECOMMENDED LIMIT—THOUGH THE LABELS WOULD LEAD THEM TO BELIEVE THEY WERE MAKING HEALTHFUL CHOICES.

BRANDT HAS CALLED ON THE FDA TO ENACT A MORE PRECISE REPORTING AND LABELING SYSTEM THAT WOULD HELP SHOPPERS GET THE ACCURATE INFORMATION THEY NEED TO MAKE INFORMED DECISIONS.
Bicycling is a lifestyle. It’s a way of showing that you’re the kind of person who cares about the environment; you’re the type who wants to remain active; and—it turns out—you’re the sort who can help bring in millions of dollars to Cleveland’s economy.

A group of Case Western Reserve MBA students recently wondered, what effect would changing a fraction of University Circle employees from drivers to bikers have on the local market? Their findings may surprise you.

Students Justin Held, Katharine Mann, Susanna Mohan, Leigh Orne and Tsung-Han Tsai conducted an economic-impact study commissioned by the GreenCityBlueLake Institute. They found that shifting just 3 percent of University Circle’s 82,000 workers from cars to bikes could boost the local economy by as much as $100 million. According to their report, enticing 2,000 individuals to pedal to work would lead to additional shopping for bikes, gear and apparel and also would spur the development of new stores and restaurants. On top of such benefits as fewer cars in an already congested district and a 1.6-million-dollar savings in health-related costs, they expect 500 new jobs to be born out of a biking boom—not to mention the environmental benefits of fewer exhaust pipes on the roadways.

Turning drivers into bikers could steer millions into the local economy.
When it comes to understanding the origins of the moon, it’s what’s inside that counts. Geologist James Van Orman, PhD, and his team analyzed lunar magma returned to Earth by Apollo 17 and discovered 100 times more water trapped in volcanic crystals than had ever been measured previously. The findings show the moon’s interior contains as much water as the upper mantle of the Earth, raising questions about how the moon formed. The discovery strengthens the theory that the moon and Earth have a common origin. Yet it also forces scientists to reconsider the current hypothesis that water and other elements were depleted when a huge impact in Earth’s early history ejected material into orbit that became the moon.

Researchers at Case Western Reserve made a significant step toward independence for paralyzed individuals who require ventilators to breathe. Jerry Silver, PhD, restored breathing function in a model of upper spinal cord injury by reestablishing lost nerve connections to the diaphragm.

The world’s hardest material could help medical implants last a lifetime. Chemical engineer Heidi Martin, PhD, and electrical engineer Christian Zorman, PhD, are building electrodes that use a lab-grown diamond film that won’t corrode in the body’s harsh environment. The team is designing sensors and stimulators for the human brain—devices that could measure chemical or electrical changes or stimulate nerves.

A heart attack can be a wake-up call that it’s time to get serious about getting healthy, but surprisingly few actually heed that message. Nursing researcher Mary Dolansky, PhD, RN, checked on 248 survivors of heart attack, bypass surgery or angioplasty who had completed a 12-week rehabilitation course. One year later, only 37 percent of victims of cardiac events exercised three times a week to keep their hearts healthy. Interventions might be needed to keep people exercising, says Dolansky.

Case Western Reserve is one of 37 universities that joined a national effort to bring high-speed Internet services to universities and their surrounding communities. Gig U, the University Community Next Generation Innovation Project, is modeled on the success of Case Western Reserve’s Case Connection Zone. The program hopes to draw new high-tech companies to participating universities and their neighborhoods.
Locally grown produce is sprouting up around campus dining halls and taking a bite out of Case Western Reserve’s carbon footprint.

This year, the university farm supplied more than 6,500 pounds of food to campus dining halls. The farm also donated more than 800 pounds of produce to the Cleveland Foodbank.

The university farm uses organic gardening techniques and is just one source of locally grown food used by campus food provider Bon Appétit, which purchases about 27 percent of its food products from vendors within 150 miles of campus.

Obtaining an identification card is, seemingly, a normal passage through life. But lacking valid ID is keeping former prisoners from accessing public assistance programs, says social work researcher Amy Blank Wilson, PhD.

Often, she says, ex-offenders’ driver’s licenses, social security cards and other major forms of ID are confiscated when they are apprehended and are never returned. The Catch-22 of “it takes ID to get ID” can keep former prisoners from accessing programs like food stamps and Medicaid, which require clients to show ID.

Half-hearted marketing efforts and gimmicky green initiatives are not enough for companies to prove their environmental friendliness, says organizational behavior expert Chris Laszlo, PhD. In his new book, Embedded Sustainability: The Next Big Competitive Advantage, he urges companies to think strategically about their eco-friendly habits. He argues the only way to make companies competitive in today’s economy is to incorporate environmental health and social value into their core business, as they are drivers of innovation and a source of competitive advantage.

It turns out relaxing is exhausting—which could be why so many people struggle to unplug from work during vacation. Just as thinking burns energy, stopping a thought takes significant power—like stopping a truck on a downhill slope, say faculty members Daniela Calvetti, PhD, and Erkki Somersalo, PhD, and postdoctoral researcher Rossana Occhipinti, PhD.

Case Western Reserve erected one of the country’s first campus-based research wind turbines this year. The 156-foot, 100-kilowatt wind turbine will provide a portion of the Veale Convocation, Athletic and Recreation Center’s power and will offer key opportunities for alternative energy research.

Quarterback Joey Baum splits his time in the classroom between two majors—political science and international studies—and a minor in economics. Outside of class, the football captain splits his time between helping in soup kitchens, Big Brother programs and other community-service programs. Baum’s impressive balancing act is a testament to his desire to keep academics, athletics and service active parts of his college experience.

Postmenopausal women may need to get a little closer to their dentists, according to a study by dental researcher Leena Palomo, DDS. She says older women may need to see a dentist as many as four times a year because they develop more plaque and may require additional cleanings.

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Case Western Reserve received $23.5 million in gifts from Cleveland’s prominent Williamson family. The commitments will support student scholarships, professorships and programs at the Mandel School of Applied Social Sciences, the College of Arts and Sciences, the Case School of Engineering and the School of Medicine—with a special emphasis on its Department of Nutrition—while paying tribute to and recognizing the distinguished legacy of the Williamson family in Cleveland.
FINANCIAL AND STATISTICAL HIGHLIGHTS JULY 1, 2010-JUNE 30, 2011

OPERATIONS*
- Total operating surplus: $4.5 million
- Total operating revenue: $959 million
- Total operating expense: $958.5 million
- Endowment funds (market value, June 30, 2011): $1,619 million
- Gifts and pledges from private sources: $126.2 million

DEGREES AWARDED
- Undergraduate: 1,038
- Masters: 944
- PhDs: 202
- Other Doctorates (JD, MD, DMD, DNP, DMgt, DMA): 528

DEGREES BY SCHOOL (UNDERGRADUATE AND GRADUATE)
- Case School of Engineering: 510
- College of Arts and Sciences: 645
- Frances Payne Bolton School of Nursing: 261
- Mandel School of Applied Social Sciences: 129
- School of Dental Medicine: 96
- School of Law: 251
- School of Medicine: 396
- Weatherhead School of Management: 458

ENROLLMENT (FALL 2011)
- Undergraduate: 4,016
- Graduate and Professional: 5,620
- States Represented: 50
- Countries Represented: 90

CAMPUS
- Faculty (full-time): 2,843
- Staff (full-time and part-time): 3,210
- Campus Size: 155 acres

ALUMNI
- Total Alumni: 108,107
- Nobel Laureates: 15

* Revenue, expense and operating surplus (deficit) figures per Statement of Operations (unaudited)
Endowment funds figure per university financial statements
Gifts and pledges figure per internal accounting (unaudited)
All figures rounded
### 2011 COMPETITIVE SPONSORED RESEARCH PROJECTS BY SCHOOL

<table>
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<tr>
<th>SCHOOL</th>
<th>PROJECTS AWARDED</th>
<th>AWARD AMOUNTS ($ IN MILLIONS)</th>
<th>PROPORTION OF DOLLAR TOTAL</th>
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<tr>
<td>Applied Social Sciences</td>
<td>41</td>
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### 2011 COMPETITIVE SPONSORED RESEARCH PROJECTS BY SPONSOR

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### COMPETITIVE SPONSORED RESEARCH AWARDS FISCAL YEARS 2008-2011

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<tr>
<td>Federal R + D</td>
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Source: National Science Foundation, Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges, FY 2009. (Most current data.)

### TECHNOLOGY TRANSFER

- New intellectual property deals with industry: 35
- Licensing revenues: $7.3 million
- New inventions: 145
- New patent applications: 137
- Active commercial intellectual property agreements: 270

All figures rounded.