

Bulletin *of the*

CONNECTICUT ACADEMY OF SCIENCE AND ENGINEERING



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New Strategies for Data Management in CT

Data are collected every minute of every day. Companies like Amazon, Google, CVS and Facebook are leading the way in mining that data and using it to target marketing efforts.

"There are enormous amounts of data that can be mined for information," said Michelle Riordan-Nold, executive director of the Connecticut Data Collaborative. "I could talk for three days about what we can learn from this aggregate data. We now have statistical software packages that can handle the analysis of the data and the visualization software tools to display the data in compelling ways to make it understandable to the everyday consumer." The Collaborative, a public-private partnership, is working to increase the quality and availability of data for use in developing effective planning and policy.

Industry experts typically refer to data in one of two ways: "big" or "open." While various sets and subsets of data exist within these definitions, most agree that the two are not mutually exclusive.

"When I think of 'big' data, I think of social media, Internet search engines and online retailers," said Riordan-Nold. "Every word typed in on any of these sites is a data point. But, it's not just online; every credit card purchase records who we are, what we buy, when we purchase and where. Organizations collect trillions of data points

that they use to analyze their business strategy and understand their customer."

Tyler Kleykamp at the state's Office of Policy and Management (OPM) says it's important to differentiate between large files and "big" data. "We could have a massive file that consists of detailed pictures of the entire state," he said. "That would be a big file, but it is just a snapshot in time. It doesn't continually update, so I wouldn't consider that 'big' data." Kleykamp is Chief Data Officer at OPM.

Michael Mundrane, vice provost and chief information officer at UConn, agrees and takes it a step further. "Historically, we've had access to modest, homogeneous data sets," he said. "Now, we have very large, loosely structured or non-uniformly structured heterogeneous collections of data. It's 'big' both in terms of scalability and value because it is now cost-effective to collect tons of data. The trend is to keep all the data because that's cheaper than deciding what to keep and what to throw away."

To support researchers at the university, "big" data becomes critical. Mundrane explained that for a number of years, public- and private-sector granting organizations that fund research have required researchers to make data available post-publication. "Granting organizations evaluate the data

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From the National Academies

The following is excerpted from press releases and other news reports from the National Academies (www.national-academies.org).

◆ 'Convergent Research' Key to Innovation Says New Report

"Convergent research"—which crosses disciplinary boundaries, integrating tools and knowledge from the life sciences with physical, chemical, mathematical, computational, engineering and other fields—is a "key strategy" to spur innovation and help address societal challenges, according to a new report from the National Research Council. However, the nation's research institutions lack guidance on how to establish effective programs, including what strategies other organizations have used to address the issues and challenges that arise. The report notes that convergent science requires a culture shift at research institutions, which have traditionally organized research around separate disciplines. It also requires partnerships to support cross-disciplinary research and to translate advances into new products. The report identifies steps institutions and the nation can take to support these partnerships, and identifies areas where convergent

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Dianna Roberge-Wentzell, left, Chief Academic Officer at the Connecticut State Department of Education, with Frederick Leonberger, center, and CASE President Louis Manzione. (Photo Frank Labanca)

Frederick Leonberger Honored with 2014 CT Medal of Technology

CASE member Frederick J. Leonberger was honored at the June 5 CASE Annual Meeting and Dinner with the 2014 Connecticut Medal of Technology for his outstanding accomplishments in the field of photonics and fiber-optics, primarily in the area of electro-optic devices. The medal was presented by Dianna Roberge-Wentzell, Chief Academic Officer at the Connecticut State Department of Education.

For almost 40 years, Leonberger has been a leading contributor to his field not only in the development of a variety of important optical devices, but in product and business strategy, commercialization and overall company leadership. The integrated optical modulators he pioneered have been used pervasively for over 15 years to encode data at billions of bits per second in long-haul fiber optic networks. Similar modulator devices are widely

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plan," he said," because they realize there is future value in the raw, aggregate data, not just in the published report."

The university is providing pathway storage options for research teams so that data won't be lost. "There are a few key issues," Mundrane said. "First is the amount of data you can maintain yourself. Second is having the bandwidth and infrastructure necessary to be able to move data around. Third is the challenge of remote research. In the past, we'd give someone a copy of something to work on. Now, the data sets are so large that moving them can be problematic."

The Connecticut Coalition for Research Computing (CCRC), a newly formed consortium of institutions interested in research computing, is working together to develop cost-effective ways to meet the need for high-volume data management. Other computing initiatives, like the Massachusetts Green High-Performance Computing Cluster, are being developed across the country and will serve as a resource for the CCRC.

Mark Raymond, chief information officer for the State of Connecticut, says that the state is well positioned to connect researchers. "We have an infrastructure in place to be able to move large data via a fiber-optic network that runs across the state," he said. "We can collect and move data and are more prepared than other states to be able to do so."

The Connecticut Academy of Science and Engineering

The purpose of the Academy is to "provide guidance to the people and the government of the State of Connecticut ... in the application of science and engineering to the economic and social welfare."

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According to Raymond, the existing network has the ability to accommodate significant additions, such as the addition of a 10-gigabit circuit to support The Jackson Laboratory for Genomic Medicine currently under construction in Farmington.

While Raymond sees state government as a peripheral user, he sees potential value in using "big" data in applications like environmental monitoring. "Advances in 'big' data collection and analysis can help us conduct real-time monitoring of shellfish beds in Long Island Sound," he said. "This is an application of 'big' data that will affect livelihoods and food safety."

Another direct application of note for Raymond is cybersecurity and the ability to detect patterns that might indicate fraud, waste and abuse. "We collect and correlate every entry and exit to our web site," he said. "We know what's being done with data along the way and we have logs of what's happening and event correlation to see if there are patterns of things we wouldn't have noticed on our own. For example, if we see certain network traffic spikes from given network IP addresses, it points us more quickly to areas that may need special attention. It helps us find the needle in the haystack to address cybersecurity issues."

Raymond noted that other potential applications could include monitoring bridge conditions, evaluating traffic and observing road conditions as well as collecting sales tax via mobile devices. "We could also integrate with social media to understand the trending concerns of our 3.5 million residents," he said.

While Kleykamp agrees with Raymond that state government doesn't typically deal with "big" data, he cited another exception: the P20Win (Preschool through 20 and Workforce Information Network) Project, a joint project between the State Department of Education, Board of Regents for Higher Education and the Department of Labor. "This effort to track students of all ages on a continual basis and evaluate their performance and career path is a little more aligned with the potential for 'big' data," he said. "The idea is that linking all of this data will promote sound educational policies and programs. The challenge is that all of the information needs to be de-identified, so that all personally traceable facts are removed."

So, how is "open" data different?

Industry insiders typically define "open" data, as information that is publicly available, but not always readily shared. In Connecticut, a culture shift began earlier this year, when Governor Dannel P. Malloy signed Executive Order 39, which creates a statewide Open Data Portal, an online portal where raw data collected across all state government agencies will be shared with the public.

"Sharing data collected by state government will help to break down silos within government, make data more easily available for analysis by researchers and entrepreneurs and, in turn, help spur economic growth and creative new policy," Malloy said. "This data belongs to the people of Connecticut, and this initiative will help make that data more easily and conveniently accessible to them."

Kleykamp sees the executive order as a step in the right direction. "In the past, agencies have collected data for their own use and have considered it their property," Kleykamp said. "With this shift in thinking, the same data can be collected once and then be available to other agencies and members of the public for use."

Kleykamp cites transparency as the biggest benefit of "open" data. "It will also improve efficiency by reducing re-work," he said. "For example, when a person changes their address with one agency, their address will be simultaneously updated at other agencies; reducing opportunities for human error and improving accuracy. It

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Biomedical Research

BIOMEDICAL RESEARCH INSTITUTE GETS \$1.5M GIFT. On February 4, Ridgefield residents **Rudy** and **Sally Ruggles** donated \$1.5 million to the **Western Connecticut Health Network Biomedical Research Institute** in honor of **Cristiano Ferlini**, to support the institute's cancer research initiatives. The gift creates and endows the Rudy and Sally Ruggles Chief of Cancer Research, the institute's first endowed position. The **Western Connecticut Health Network** was created in 2010, and is anchored by three hospitals, **Danbury Hospital**, **New Milford Hospital** and **Norwalk Hospital**, as well as their affiliated organizations. Research at the Institute, which opened in Danbury in 2011, initially focused on studying the reproductive cancers in women.

YALE HIV STUDY MAY HELP PREDICT BEST THERAPIES. A study conducted by **Yale** researchers and published in *PLOS Pathogens* on February 28 shows that cell-to-cell transmission of HIV particles contributes to the development of full-blown AIDS and helps predict which anti-retroviral therapies are most effective at keeping the disease from developing. This new research validates recent evidence indicating that a heavy concentration of the virus at the point of contact between cells is key to promoting the development of AIDS. The cell analysis reported in the study showed that 13 of the 16 anti-retroviral drugs are effective. Senior author **Walther Mothes**, associate professor of microbial pathogenesis at the Yale School of Medicine, said the effectiveness against highly concentrated HIV should be tested by companies developing more powerful therapies to combat AIDS.

SOUTHEASTERN CT BIOSCIENCE GROWTH BILL PASSES. In May, the **General Assembly** passed Public Act 14-217, which included provisions (Sec. 212) requiring that by February 1, 2015, the state **Commissioner of Economic and Community Development** must "establish and administer a program to promote and support the development of bioscience and biotechnology businesses in the Southeastern Connecticut Planning Region. The commissioner shall develop such program in consultation with **Connecticut Innovations, Incorporated**, **Connecticut United for Research Excellence, Inc. (CURE)**, the **Southeastern Connecticut Enterprise Region**, the **Chamber of Commerce of Eastern Connecticut** and other organizations in the region with experience in the formation of or assistance to start-up businesses, fundraising, networking and marketing." The program must include outreach to "entrepreneurs, regional community and business leaders and experts in the bioscience and biotechnology fields" as well as a marketing plan for bioscience and biotechnology development in the region and a working group of 10-15 business and community leaders to encourage networking and planning between professionals from different fields; support the development and occupancy of CURE's new **Innovation Commons**, an incubator hub for entrepreneurs, scientists and start-up and growing businesses; assess the program; and make recommendations to the commissioner.

UCONN TEAM USES GENOMICS TO ID ORAL FUNGI. Earlier this spring, **UConn** researchers announced they had used a genome-based approach to identify fungi that live in the mouth of healthy individuals, an advance that could help medical professionals improve treatment and possibly prevent oral infections from occurring in patients with suppressed immune systems. "This is the first study to identify medically-important oral fungi on a large scale,"

says **Linda Strausbaugh**, professor of molecular and cell biology at UConn. The UConn team used a novel approach to "breaking" fungi in the laboratory, using special zirconia beads to crack open fungi collected from people's saliva samples, allowing them to investigate the DNA of a wide range of oral fungi. Further research will look at oral fungi changes over time for individuals undergoing chemotherapy treatments, tracking the relationship to oral lesions. The research, supported by a four-year, \$3 million National Institutes of Health grant, appeared in the March 10 issue of *PLOS One*.

COURTAGEN LIFE SCIENCES, CHILDREN'S MEDICAL CENTER TO COLLABORATE. **Courtagen Life Sciences, Inc.**, a molecular information company, announced in April that it would enter a collaboration with **Connecticut Children's Medical Center**. "Through the use of our new devSEKTM sequencing panel targeting developmental delay, intellectual disability, and autism spectrum disorders, we expect our collaboration to help elucidate the linkages between certain gene alterations and ASD phenotypes beyond what is possible with current testing technologies, such as chromosomal microarrays," said **Brian McKernan**, CEO of Courtagen. **Louisa Kalsner**, pediatric neurologist at Connecticut Children's Medical Center stated, "We anticipate that through analysis of detailed historical and medical information, alongside results of the sophisticated genetic analysis provided by Courtagen, we will gain a better understanding of which genes play a role in the development of autism in our patients."



Business & Industry

UTC, STATE AGREE ON AEROSPACE REINVESTMENT. On May 9, **Governor Dannel P. Malloy** signed Public Act 14-2, An Act Concerning The Connecticut Aerospace Reinvestment Act, which was introduced to support an agreement the state reached in February with **United Technologies Corporation (UTC)** under which the company will invest up to \$500 million to upgrade and expand its aerospace research and development and manufacturing facilities over the next five years. As part of the agreement, UTC will construct a new **Pratt & Whitney** corporate headquarters, which it will keep in Connecticut for a minimum of 15 years; construct a new Pratt & Whitney worldwide engineering center of excellence in Connecticut; keep **Sikorsky** corporate headquarters in Connecticut for a minimum of 5 years; create a customer training center at **UTC Aerospace Systems (UTAS)** in Windsor Locks; build new labs and infrastructure at **United Technologies Research Center (UTRC)**; and invest in new research projects and capital investments at Pratt & Whitney, Sikorsky, UTAS and UTRC. During the same time period, UTC expects to invest up to \$4 billion in research and other capital expenditures in the state, impacting more than 75,000 jobs in the Connecticut. Construction on the projects is expected to begin this year and continue through 2018.

ELECTRIC BOAT TO PRODUCE 10 NEW SUBS FOR NAVY. On April 28, **General Dynamics** announced that its subsidiary, **Electric Boat**, will build ten more Virginia-class submarines, under a \$17.65 billion contract with the US Navy. Along with its partner, Newport News Shipbuilding, the company will build two ships each year for the next five years. Currently, Electric Boat and Newport News Shipbuilding have completed ten submarines for the Navy, with eight others under construction.

Pfizer Donates Facilities to New Tech Incubator. On April 2, **Pfizer** agreed to donate two vacant buildings on its Groton

Items that appear in the In Brief section are compiled from previously published sources including newspaper accounts and press releases. For more information about any In Brief item, please call the Academy at (860) 571-7143, or contact us at acad@ctcase.org.

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campus to become the **CURE (Connecticut United for Research Excellence) Innovation Commons**, an incubator hub for entrepreneurs, scientists and start-up and growing businesses. In February, the **State Bond Commission** approved a \$4.2 million grant for **CURE Innovations, LLC**, to fund renovations and initial costs associated with CURE Innovation Commons. "Last year, Pfizer had to make some difficult decisions to address excess capacity at its Groton campus," said **Catherine Smith**, commissioner of the state **Department of Economic and Community Development**. "We are grateful that the company worked so closely with the state and many local stakeholders to look for innovative solutions."

OVATION TO CLOSE GUITAR PLANT. The **Ovation** guitar factory announced in April that it will close its **New Hartford** plant, where the guitar is currently manufactured, in June. Ovation guitars have been built in that location since 1967, when the late **Charles Kaman**, CASE member and founder of **Kaman Aircraft Corporation**, developed his first guitar. Glen Campbell was among the first stars to bring renown to Ovation, but others who played the company's guitars included Paul Simon, John Lennon, Paul McCartney, Mick Jagger, Eddie Van Halen, Alex Lifeson, Neil Diamond, Kenny Rogers, Melissa Etheridge, Roger Waters and David Gilmour.



Communication

'HISTORIC TECHNOLOGICAL TRANSFORMATIONS.' In February, the FCC announced that it would begin experiments to prepare for "historic technological transformations" in the telecommunications industry as more consumers move away from traditional wireline services. "The FCC has voted 5-0 to take a significant step toward recognizing the impacts of public policy on innovation and technological progress by approving trials, that they will oversee, to study and plan accordingly for a transition toward Internet-based communications networks," said **AT&T Connecticut President John Emra**. The FCC experiments will take place in specific geographic regions and will investigate a number of issues including emergency communications, services for people with disabilities, broadband access to rural areas, and telephone number assignments.

VERIZON WIRELESS TO ADD CT WORKERS. **Verizon Wireless** announced plans this spring to hire 103 people in Connecticut for retail, sales and customer service positions. The company, which currently employs more than 900 Connecticut workers, announced hiring plans that include an extensive benefits package.



Education & Cognition

SCIENCE AND ENGINEERING FAIR DRAWS 240 STUDENTS. On February 11, the 14th **Southern Connecticut Science & Engineering Fair (SCSEF)** was held at **Newtown High School**. A total of 240 students participated, receiving verbal and written feedback on their projects to help them with future work. Each student created an exhibit, made a presentation, and participated in a question and answer session. Volunteer judges evaluated entries in behavioral sciences, environmental sciences, health and physical sciences. Additionally, there were team projects in each of the categories.

IBM, NORWALK SCHOOLS PARTNER TO CREATE NEW TECH ACADEMY. In April, state officials announced that Connecticut's first **Pathways in Technology Early College High School (P-TECH)**

model school, the **Norwalk Early College Academy**, will open at **Norwalk High School** in September. The school will integrate high school and college curricula for grades nine through 14 and students who complete the program will graduate with a high school diploma and an Associates' Degree in applied science. IBM will partner with **Norwalk Public Schools** and **Norwalk Community College** to create the new academy. IBM vice president **Stanley Litow** said the program embeds in every course the workplace skills necessary for students to be successful. "It also includes mentoring," he said, "[and] lots of interaction with people in the workplace.... [It] provides a special, seamless entry from high school courses into the community college courses."

REPORT FINDS DANBURY SCHOOLS UNDERSTAFFED IN TECHNOLOGY AREAS. A report by the New Haven-based **Connecticut Council for Education Reform (CCER)** found that although **Danbury** public schools showed progress acquiring technology, the district is understaffed in regard to personnel who can maintain equipment and provide guidance about data necessary to improve teaching and learning, compared to similar districts. To prepare for the state-mandated Smarter Balanced Assessments next year, **Danbury High School** will need a large investment in desktop models and additional mobile laptops to have enough computers for testing, according to school district finance director **Joe Martino**.



Energy

NRC GRANTS MILLSTONE TWO PERMISSION FOR WARMER COOLING WATER. On April 21, the Nuclear Regulatory Commission (NRC) announced that the **Millstone Two** nuclear power plant, which provides half of Connecticut's power, has permission to use Long Island Sound water as warm as 80° F for cooling at one of its two units in **Waterford**. The plant was shut down for approximately two weeks in August 2012 because the water was warmer than the 75° F limit. The NRC said the plant's safety equipment and systems would continue to function without problems using the higher temperature limit. According to the agency, the change to Millstone's license is intended to prevent an "unnecessary plant shutdown" in severe hot weather.

CHESHIRE SOLAR INSTALLATION ONE OF LARGEST IN CT. Pennsylvania-based **Dynamic Energy Solutions** recently announced completion of one of the largest roof-mounted solar arrays in Connecticut—an 860kW installation for **Napoli Foods** in **Cheshire**. The solar photovoltaic system involved installing a roof-mounted, ballasted array consisting of more than 2,900 solar panels. With an anticipated annual production of 1,095,000 kWh, the solar system will effectively eliminate 773 metric tons of CO2 emissions per year. "We are thrilled that such a significant portion of our facility's energy will be supplied by a renewable source," said **Michael Cipriano**, vice president of **Napoli Foods**.

RELIABLE POWER IN SUMMER HEAT. During the summer, consumer demand for electricity peaks in New England, largely because of the increased use of air conditioning. Last summer, electricity usage peaked on July 19, 2013, at 27,379 MW. In New England, 1 MW of electricity can power approximately 1,000 homes. Because of the region's growing reliance on natural gas as a fuel to produce electricity, **ISO New England** announced recently that it would take steps to communicate about the risks associated with uncertain natural gas supplies during peak operating conditions. A recent Federal Energy Regulatory Commission order and subsequent ISO New England tariff changes have improved

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the ability of ISO system operators to communicate with the operating personnel of interstate natural gas pipeline companies for maintaining power system reliability.

NEW AFFORDABLE HOUSING EFFICIENCY PROGRAM TAKES EFFECT. On March 8, the **Affordable Housing Energy Efficiency Program** was put into effect, funding energy conservation or renewable energy projects for Connecticut residents living in multifamily homes. The program helps homeowners with mortgages with the **Connecticut Housing Finance Authority** and tenants in homes owned by a public housing authority or subsidiaries. It will cover basic energy-efficiency measures such as insulation and building enclosure improvements up to high-efficiency heating and cooling systems, energy management systems and renewable energy systems—including solar or photovoltaic panels—in order to bring cleaner, cheaper and more reliable energy to Connecticut homes.

DEEP HONORS GROUPS FOR CUTTING 'PEAK DEMAND' USAGE. On April 22, the Connecticut **Department of Energy and Environmental Protection** recognized eleven organizations, including retailers, schools and health care facilities, for reducing their electricity demand during the 2013 "peak demand" summer season. To qualify for this recognition, organizations needed to reduce their consumption 5–20%, compared with the previous two summers and without using backup diesel generators. **Southington High School** received the Peak Performer Award for reducing its electricity demand by 421 kilowatts or 36%. Other awardees from around the state lowered their combined peak electricity demand by a total of 618 kilowatts, and carbon dioxide emissions by 175 tons.

FUELCELL ENERGY WINS CONTRACT FOR TWO NEW POWER PLANTS. On April 30, Danbury-based **FuelCell Energy** announced it had won a contract to build and operate two 2.8 MW fuel cell power plants in Connecticut for **United Illuminating (UI)**. One plant will be located on an unused landfill in Bridgeport and will be part of a distributed renewable power generation project that also includes a solar array. A second installation will be located within the UI service territory in a location to be announced at a later date. The plants are expected to be completed next year.



Environment

AS SEA LEVELS RISE, CAN SALT MARSHES KEEP UP? Researchers at the **Yale School of Forestry & Environmental Studies** are investigating the ability of coastal salt marshes to migrate upland in the face of sea level rise along the Connecticut coastline and how the ecosystem types found at higher elevations will affect that potential migration. During a two-year investigation, researchers will attempt to determine how quickly marsh systems along **Long Island Sound** can colonize newly wet areas as sea levels rise, how the process varies depending on characteristics of the upland areas, and what humans can do to encourage the migration. The study, which is being funded by **Connecticut Sea Grant**, will look specifically at critical indicators of marsh expansion in upland areas, including the frequency of tidal flooding, soil conditions, vegetation, and the presence of microscopic organisms that only live in saltwater.

CT HUNTERS LEAD IN HUNTING SAFETY. In February, the Connecticut **Department of Energy and Environmental Protection (DEEP)** announced that 2013 was the third consecutive year with no hunting-related injuries involving the discharge of a firearm or bow. "Connecticut hunters continue to be national leaders in hunting safety, due in large part to mandatory firearms and archery education programs, which have produced a safety-conscious generation of hunters," said **Rick Jacobson**, director of the **DEEP Wildlife Division**.

RESIDENTIAL WOOD SMOKE EMISSION STANDARDS SOUGHT. In February, the **American Lung Association of the Northeast**, the **Sierra Club of Connecticut**, and **Environment and Human Health, Inc.**, announced plans to submit a legal petition to the **Department of Energy and Environmental Protection** asking for regulatory air standards for residential wood smoke emissions from wood-burning devices including outdoor wood furnaces, indoor wood stoves, and other devices. **David Brown**, a public health toxicologist with **Environment and Human Health, Inc.**, states, "It is time for Connecticut to adopt wood smoke air standards that will help protect the public's health, much as the State of Washington has done."

MIDDLETOWN DAM TO GET \$2M OVERHAUL. **Governor Dannel P. Malloy** announced in March that \$2.1 million will be raised to enhance the capacity of the **Dooley Pond Dam** in Middletown. The dam is currently in poor condition, with a partially collapsed spillwall and problems with water control. The funds will pay for construction of a new, higher capacity spillwall and other improvements to increase the dam capacity. The project will be administered by the **Department of Energy and Environmental Protection**.



Food & Agriculture

CT FARM GROWTH TOPS IN NEW ENGLAND FOR 2007-2012. Data released on February 20 from the federal **Census of Agriculture** showed that Connecticut had the fastest rate of farm growth in New England between 2007 and 2012, with the number of farms increasing 22%. Additionally, the amount of land farmed in Connecticut grew by 8%, or 30,790 acres in 2007 to 436,406 acres in 2012. Farms with 50 acres or fewer grew the most; farms of between one and nine acres grew by 540 farms over the five-year period, while the number of farms of between 10 acres and 49 acres grew by 506 over the same period of time. **Governor Dannel P. Malloy** hopes to see increasing land farmed in the years ahead because of the **Farmland Restoration Program** launched in 2012. "Despite an overall decline in farm numbers nationally, Connecticut has made great strides in this area," Malloy said.

FARMS, FARMLAND PRESERVATION GRANTS ANNOUNCED. On March 20, state officials announced that \$880,327 will be given to more than 40 farms, agricultural nonprofits and municipalities to expand Connecticut's agricultural economy. Funding was made through the **US Agriculture Department's Farm Transition Grant** and **Farm Viability Grant** programs, which are designed to increase farm production and promote Connecticut Grown products and jobs. "Connecticut's agriculture economy is making many significant advances in the right direction, and these grants will help keep that momentum going," said **Steven Reviczky**, **Department of Agriculture** commissioner. On April 9, **Governor Dannel P. Malloy** and federal officials announced an agreement allowing Connecticut access to more than \$8 million in federal funds for farmland preservation. The money must be used by March 31, 2015. More than 300 Connecticut farms are protected under the **Farmland Preservation Program**.

BRIDGEWATER LAUNCHES FIRST CURBSIDE COLLECTION OF FOOD SCRAPS. In April, the town of **Bridgewater** implemented the state's first curbside collection program for food scraps. Town officials are coordinating with the **Housatonic Resources Recovery Authority (HRRRA)** to implement a six-month pilot program, which provides interested residents with a 2-gallon kitchen counter collection bin, a 6-gallon curbside bin and compostable bags, and an information packet. According to **Jen Iannucci**, HRRRA's assistant director, "HRRRA's ongoing role in the program is to educate resi-

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dents, answer questions, work out issues that arise during the pilot, coordinate the efforts of residents, the waste hauler and composters to insure a successful program, and increase the number of participants." **All American Waste**, the hauler that services 92% of the collection routes in Bridgewater, agreed to pilot the program for free.



Health

HEROIN-RELATED OVERDOSE DEATHS RISE. On March 10, the Connecticut medical examiner's office released a report stating that heroin-related overdose deaths in the state increased 48% from 2012 to 2013. The number of deaths involving cocaine rose 40%, according to **James Gill**, the state's chief medical examiner. According to the Connecticut **Department of Mental Health and Addiction Services**, heroin addiction is the second most common addiction, after alcohol, for which people seek treatment. The agency reports that 10,183 people were admitted for treatment for heroin last year at licensed programs, up from 8,954 in 2012 and the highest total in the past eight years.

MEASLES REPORTED IN FAIRFIELD COUNTY. On March 11, the **Department of Public Health** (DPH) reported two cases of measles in **Fairfield County** following several in New York City. Nationwide, the federal Centers for Disease Control (CDC) reports 334 cases in 18 states during the first five months of 2014. Measles causes fever, runny nose, cough and a rash all over the body. About one out of 10 children with measles also gets an ear infection, and up to one out of 20 gets pneumonia. For every 1,000 children who get measles, one or two will die, according to the CDC. According to state DPH officials, the two Connecticut cases involved an infant and an adult, neither of whom had been vaccinated for the disease (the infant was too young to be vaccinated). Connecticut requires immunization before a child can enroll in public school; however, parents can opt out for religious or philosophical reasons. According to **Yale** infectious diseases specialist **Louise-Marie Dembry**, everyone should make sure that they are appropriately immunized for protection against measles and that their vaccination status is up to date.

'HEALTHY CONNECTICUT 2020' OUTLINES HEALTH CARE CHALLENGES. On April 8, the **Department of Public Health** (DPH) issued a new report called "Healthy Connecticut 2020," outlining challenges for Connecticut health care professionals in the coming decade. According to DPH Commissioner **Jewel Mullen**, Connecticut is meeting most targets for smoking, obesity, and teen birth rates. However, there remains a disparity among different racial and income groups.



High Technology

UCONN RESEARCHERS ANNOUNCE NEW PROCESS FOR MANUFACTURING POROUS MATERIALS. On February 20, **UConn** chemists announced a new process for making a class of porous materials that allows for greater manufacturing controls and has significantly broader applications than the longtime industry standard. Because the key catalyst in the process is recyclable, the technology is considered green. "This is definitely the most exciting project I've been involved in over the past 30 years," says CASE member and Board of Trustees Distinguished Professor **Steven L. Suib**, the project's principal investigator. The research is the first major work to come out of the university's new Center of Excellence, the **GEMS Center**.

'DESIGN YOUR OWN APP' On March 17, Connecticut leaders and students held a press conference at **New Britain High School** to announce the "design your own app" competition for high school students. **US Rep. Elizabeth Esty**, **New Britain Mayor Erin Stewart**, **Naugatuck Valley Community College President Daisy Cocco De Filippis**, **Starbase CT Executive Director Melissa Vanek**, **New Britain Superintendent Kelt Cooper**, **Bruce Dixon**, **Executive Director, CPEP**, and high school students involved in CPEP all attended the conference. Esty is a co-founder of the US House Student App Challenge, the first annual nationwide congressional STEM academic competition. She also introduced the STEM Jobs Act to support teacher professional development in the STEM fields.

UCONN TO SPEARHEAD NANOSCALE HARDWARE SECURITY PROTECTION RESEARCH. On April 28, the US Department of Defense awarded a \$6.8 million grant to **UConn**, the University of Maryland, and Rice University to support research for analyzing and upgrading security protections for nanoscale computer hardware. This initiative will be spearheaded by **UConn's Center for Hardware Assurance, Security, and Engineering** (CHASE) and will include 10 researchers representing the three universities. Nanoscale devices are many thousands of times smaller than the width of a human hair and are widely used in microelectronics, particularly for national security, commerce, energy, and transportation.



Transportation

I-84 WIDENING AMONG MAJOR PROJECTS SCHEDULED. Widening of the Interstate 84 corridor in Waterbury is one of several major state transportation improvement projects scheduled by **ConnDOT** using approximately \$1.8 billion in state and federal transportation improvement funds. Other projects include completion of the new **Pearl Harbor Memorial Bridge** in New Haven, replacing the existing bridge carrying I-95 over the mouth of the Quinnipiac River; rehabilitating the **Putnam Bridge** along Route 3 in Glastonbury; replacing the I-84 viaduct in Hartford; renovating a portion of the **Merritt Parkway** in Stamford; and making various improvements along I-95 in Norwalk. The projects are part of a five-year highway, bridge and rail improvement plan.

\$10M METRO-NORTH POWER SUPPLY UPGRADE. On February 3, **ConnDOT** announced a \$10 million project to upgrade the power supply for **Metro-North Railroad's** New Haven line. The goal is to prevent a power failure similar to one that occurred last fall in Mount Vernon when a Con Ed feeder line failed, seriously disrupting service for over a week.

FORMER CASKET FACTORY TO BECOME BUS-RAIL TRANSIT CENTER. On February 3, the nonprofit **Enfield Community Development Corp.** paid \$165,000 for a casket factory to be developed into the **Thompsonville Transit Center**: a bus-rail transit center. The nonprofit used a \$350,000 brownfields remediation grant from the **Department of Economic and Community Development** to purchase the site. The next development phase includes drilling and soil testing to determine toxin levels in surrounding soils or other hazardous materials inside or outside the structure. The transit station is expected to be part of the **New Haven-Hartford-Springfield** line, offering connections to New York and Boston, and eventually, Montreal. The plan also includes using the location as a bus stop for local buses that run throughout the region and to Hartford and Springfield. Enfield officials estimate rail service to begin sometime around 2020.

Compiled and edited by Wendy Swift

approaches could accelerate innovation and help meet broad challenges, including creating new fuels and energy storage systems, meeting the world's need for secure food supplies in a changing climate, and developing new treatments for chronic illnesses. The report summarizes the lessons learned and provides organizations with strategies to tackle practical needs and implementation challenges in areas such as infrastructure, student education and training, faculty advancement, and inter-institutional partnerships.

http://www.nap.edu/catalog.php?record_id=18722

◆ Third National Climate Assessment Released

On May 6, the US Global Change Research Program (USGCRP) released the Third National Climate Assessment, a comprehensive scientific report on US climate change impacts. The report collects, integrates, and assesses observations and research from around the country and includes analyses of impacts on seven sectors—human health, water, energy, transportation, agriculture, forests, and ecosystems—and the interactions among sectors at the national level. It also assesses key impacts on all US regions: Northeast, Southeast and Caribbean, Midwest, Great Plains, Southwest, Northwest, Alaska, Hawaii and Pacific Islands, as well as the country's coastal areas, oceans, and marine resources. The report, which documents changes already observed and those projected for the future, confirms that climate change is affecting every region of the country and key sectors of the US economy and society.

The USGCRP was established by Presidential Initiative in 1989 and mandated by Congress in the Global Change Research Act (GCRA) of 1990 to “assist the Nation and the world to understand, assess, predict, and respond to human-induced and natural processes of global change.” The USGCRP is required under law to prepare and submit to the President and the Congress an assessment at least once every four years, of which the recently released report is the third. A team of more than 300 experts led by a 60-member Federal Advisory Committee produced the report, which was extensively reviewed by the public and experts, including federal agencies and a panel of the National Academy of Sciences.

<http://nca2014.globalchange.gov/>

◆ Assuring Quality of Stem Cell Therapies

Stem cells offer tremendous promise for advancing health and medicine, including the potential to treat such debilitating conditions as Parkinson's disease, diabetes, and spinal cord injury. Clinical trials of stem cell treatments are under way in countries around the world, but the evidence base to support the medical use of stem cells remains limited. Despite limited clinical evidence, consumer demand for treatments using stem cells has risen, driven in part by a lack of available treatment options for debilitating diseases.

To explore these issues, the Institute of Medicine, the National Academy of Sciences, and the International Society for Stem Cell Research held a workshop in November 2013. *Stem Cell Therapies* summarizes the workshop. Researchers, clinicians, patients, policy makers, and others from North America, Europe, and Asia met to examine the global pattern of treatments and products being offered, the range of patient experiences, and options to maximize the well-being of patients, either by protecting them from treatments that are dangerous or ineffective or by steering them toward treatments that are effective. This report discusses the current environment in which patients are receiving unregulated stem cell offerings, focusing on the treatments being offered and their risks and benefits. The report considers the evidence base for clinical application of stem cell technologies and ways to assure the quality of stem cell offerings.

http://www.nap.edu/catalog.php?record_id=18746

◆ New Studies Warn Changes to Arctic Require Improved Research Resources, Collaborations

According to a new report from the National Research Council (NRC), the climate, ecosystems, and communities of the Arctic are changing rapidly in complex ways that have implications throughout the region and, increasingly, around the globe. The report found that changes to Arctic snow and ice—summer sea ice lost approximately 75% of its value since 1980 and half of its areal coverage, while 97% of Greenland's surface experienced the largest melt extent in the satellite era in 2012—exacerbate climate change and are the largest contributors to expected global sea level rise during the next century. The report presents emerging research questions that address newly recognized phenomena, make use of new technology or avenues of accessibility, or build on recent research results and insights. The ability to address these and future emerging research questions requires cooperation among research disciplines, agencies, and the private sector, as well as between researchers and decision makers, the report says, noting that improved collaboration on both the funding and logistics of doing international research is also needed. The report identifies the key resources and strategies for addressing emerging research questions, including interdisciplinary, international, interagency, and private-sector cooperation; improved operational and human capacity; long-term observations; and sustained investment in Arctic research.

http://www.nap.edu/catalog.php?record_id=18726

Another new NRC report, *Responding to Oil Spills in the U.S. Arctic Marine Environment*, warns that climate changes are increasing the accessibility of US Arctic waters to commercial activities such as shipping, oil and gas development, and tourism, raising concern about the risk of oil spills. The report says that a “full suite of proven oil response tools” is needed to address potential oil spills, but not all of them are readily available, urging additional research to enable more informed decisions about the most effective response strategies for different Arctic spill situations.

http://www.nap.edu/catalog.php?record_id=18625

Medal (from page 1)

used to transmit CATV signals. These devices are manufactured in Bloomfield and that business has had a substantial economic impact on Connecticut (valued at more than \$500 million).

In his early career with the MIT Lincoln Laboratory, Leonberger developed a breakthrough analog-to-digital converter device, which incorporated micron-scale guided-wave modulator integration on a single chip. He joined United Technologies Research Center (UTRC) in 1984 as manager of Photonics and Applied Physics. The major technologies developed in UTRC groups Leonberger led have all spawned commercial Connecticut businesses: United Technologies Photonics (UTP) in Bloomfield; CiDRA, in Wallingford; and DEOS, now part of Coherent, in Bloomfield. In 1992, Leonberger co-founded and became General Manager of UTP. In 1995, UTP was acquired by Uniphase Corporation and Leonberger went on to become Chief Technology Officer and Senior Vice President of that company and continued in that role after the Uniphase/JDS Fitel merger. He retired in 2003 and founded EOvation Technologies (now EOvation Advisors), a technology and business advisory firm serving photonics and laser companies. In addition to advising senior management teams, he presently serves on the Board of Directors of four private venture-funded photonics companies.

A University of Michigan graduate, Leonberger holds a PhD in electrical engineering from MIT. He was elected to CASE in 1985 and to the National Academy of Engineering in 2000.

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Data *(from page 2)*

takes the same information collected now and makes it available to a greater audience."

Another advantage of "open" data is the ability to make "data-driven" policy decisions. "By removing all personal information and using the non-identifiable data we can have conversations based on federal and state agency data sets that have never been compared before and see if there are relationships," Riordan-Nold said. "We can also make better decisions about whether we need more or less programming in a given area and evaluate the effectiveness of existing programs. Making policy and programmatic decisions without knowing the effect is the equivalent of throwing good money at bad."

The Connecticut Data Collaborative is developing interfaces that will make it easier to use and understand the data. "It's not enough to just have the information out there in raw format; people often don't have the time to analyze raw data," Riordan-Nold said. "They need it to be easily accessible and presented in a visual format."

According to Riordan-Nold, good things can happen as a result. "We can bring people together who are doing the same or similar research," she said. "'Open' data gives us the opportunity to explore relationships between indicators and data sets and to re-purpose research data, saving time, effort and money across the board."

Raymond noted that data sharing among agencies could lead to better service to the public. "For example, 'open' data could make it possible for people who qualify for one government service to be notified automatically about other services they might use," he said.

Kleykamp also cites possible entrepreneurial opportunities. "In addition to technology companies, there may also be applications for insurance companies to predict the likelihood of storms, robbery or cancer clusters in a given neighborhood," he said. "Let's put the

information out there and people smarter than me from all kinds of industries will figure out ways to use it."

Technology experts are working to allay fears that all this data collection equates to a lack of privacy.

"I think what scares people right now is that we don't know exactly how people will use the data," Kleykamp said. "But in other states where they have shared data there hasn't been a 'gotcha' moment. We all need to come to terms with the fact that the data is already available. These new initiatives are simply making the data available to a larger audience and making it easier to use."

Mundrane agreed that while "big" data has become a recent buzzword, it is not a new development. "Technically everybody is already functioning in this environment today," he said. "We just don't think about it. Internet search engines collect enormous data sets. Mapping DNA is another example. Nobody understands the size of the data sets that are necessary to map DNA. Big data sets are here and we have nothing to fear that we didn't fear before."

Others are concerned that open data could be used in an inappropriate way or misinterpreted. "If the information isn't accessible then there is no opportunity to have a discussion, so there is equal opportunity for the data to be manipulated to someone's advantage," Riordan-Nold said.

Raymond noted maintaining privacy is one of the most important aspects of this work. "We need to reassure people and let them know what we are doing and why in order to build trust," he said. "We should not share personal data without citizen approval. We need to let people know that we can provide better service with open data while also protecting their privacy." — **Karen Cohen is a freelance science writer and owner of The Write Stuff, LLC.**