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TECHNOLOGY

Economist Lee Branstetter knows that artificial intelligence, robotics, autonomous vehicles and other transformative technologies are poised to profoundly disrupt the economy and workforce across the region, nation and world.

And he has a ringside seat from which to watch it unfold.

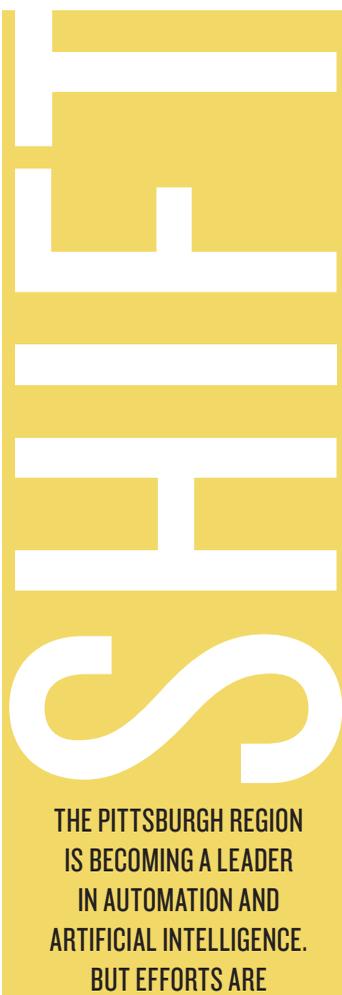
“My computer science colleagues believe this will be a big deal in the longer run, and all sectors of the economy will be utilizing these new technologies,” said Mr. Branstetter, a professor of economics and public policy and the director of the Center for the Future of Work at Carnegie Mellon University, where much of the groundbreaking science in those fields is taking place.

“We have some time to put into place policies that could cushion the impact on people who are likely to be vulnerable to these changes.”

Uber’s self-driving Volvos already roll along Pittsburgh streets and practice on a test track in Hazelwood Green, where a sustainable community is rising from the brownfield that had been the Jones & Laughlin steel mill. A few acres away, what remains of J&L’s Mill 19 is being reborn as a brain center of new technologies that includes the Advanced Robotics for Manufacturing Institute, a \$250 million public-private collaborative founded by CMU to push the boundaries of automation in U.S. industry.

In fact, innovations emerging from Pittsburgh’s companies and its major research universities, CMU and the University of Pittsburgh, have cast the region as a leading center of invention in the fields of automation, advanced robotics, autonomous vehicles, 3D printing and genomics.

The history of such far-reaching, technology-driven change is rife with examples of the economic benefits that have followed in its wake, including



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BY JEFFERY FRASER**

heightened productivity and competitiveness, new products, new markets and new jobs. Technological disruption also has eliminated entire occupations and increased demand for better-educated, higher-skilled workers. And it has sentenced those not equipped to meet those demands to economic hardship and dim prospects.

Desktop publishing software, for example, replaced entire newspaper composing room departments, eliminating typesetting jobs. More than 150,000 manufacturing jobs in the Pittsburgh region disappeared when the local steel industry collapsed under the pressure of technological change, weak demand and global competition. It triggered an exodus of mostly young adults in search of job opportunities elsewhere.

But Mr. Branstetter and others believe that doesn't have to be the case this time around. “We have an opportunity to look ahead, figure out where the next disruption is likely to occur and, for once, actually be ready with public policy interventions that can make the next round of disruptive impacts much less hurtful and more beneficial.”

An increasing number of southwestern Pennsylvania stakeholders are embracing the challenge, such as companies, universities and colleges, economic development groups, and foundations, including The Heinz Endowments. Of particular interest to the Endowments is supporting ways to improve the prospects of people already struggling to find a place in the region’s economic resurgence and to prepare them for the technological advances that are ahead.

“At the same time our city and region are waking up to a more robust economic future, we see under-educated portions of our population losing the on-ramps to those industry clusters,” said Rob Stephany, the Endowments’ director of Community

& Economic Development. “Our intent is to take a detailed look at how the region is building its economic future, look at the people who are not actively participating in it, and figure out what the bridges might be to help them get there.”

Major technological disruptions in the past did not lead to widespread, prolonged unemployment. For much of the 20th century, the level of education among American workers rose steadily, enabling them to keep pace with the constant demand for higher-skilled labor, report Harvard economists Claudia Goldin and Lawrence Katz in studies of the issue.

But, as educational attainment in the U.S. slowed near the end of the century, the advance of technology did not. And the income gap between higher-educated and less-educated workers quickly began to widen, a trend that continues today.

“Artificial intelligence and machine learning could extend these trends that we’ve been reckoning with over the past 40 years because you will be able to automate a new set of skills, reducing the demand for a new category of workers,” Mr. Branstetter said. “We’re not worried about an employment apocalypse. We’re worried that people will find jobs, but the wages they will earn, the benefits they get, will not be enough to sustain a family or a middle-class standard of living.”

The Center for the Future of Work is exploring ways to prepare for technological disruption with support from the Endowments and other foundations. For starters, researchers are trying to answer two key questions: Which industry sectors and occupations will take the brunt of the impact and when?

One way they’re doing this is to look at patent applications for clues. And they plan to let the machine learning algorithms they’re writing do the heavy lifting. Machine learning is a way to enable machines to learn tasks and improve their capabilities on their own from experience.

The idea is to have computers learn to read hundreds of thousands of patent applications, identify those involving artificial intelligence and machine learning, and compile information about them at speeds that teams of patent attorneys can’t come close to matching. The goal is to get an accurate preview of the impact of the technology by identifying industries likely to apply the patent, where on the map that will happen and what occupations will likely be affected.

Long-haul trucking is widely considered one of the major occupations that could be among the first to absorb the impact of the rise of autonomous vehicles. With Endowments support, researchers are scouring data, such as the distribution of trucking activity across market segments and where truck drivers live, to get a sense of how the industry is likely to automate in the next 30 to 40 years and predict where and how the labor impact will be felt.

“We can tell policymakers where these people live and how far they are going to fall down the income ladder if they lose their trucking jobs,” Mr. Branstetter said. “It will

be useful, even essential, for policymakers to know where in geographic space and industry space these technologies are going to be implemented so they know where the shocks are going to be first felt.”

The Keystone Research Center is working with CMU researchers to investigate policy options for softening the impact on workers displaced by transformative technologies, such as a system of wage insurance, and preparing a broader population of men and women for the jobs of the future so they might benefit from the economic shift rather than be driven to hard times. And researchers at the Harrisburg-based labor research nonprofit are extending their investigation beyond U.S. borders to compare how other countries deal with workforce disruption.

Studies suggest that it doesn’t take a Ph.D. to land a decent job in an innovation economy. About half of the jobs related to science, technology, engineering and mathematics in the U.S. are “middle-skill” occupations that don’t require a bachelor’s degree, but do require workers to complete some type of post-secondary education program to acquire the skills the jobs demand.

“Middle-class wage growth drives economic demand. Education and skills training are public goods and generate benefits for employers as well as the workers trained,” said Stephen Herzenberg, an economist and executive director of the Keystone Research Center. “There is solid evidence that helping people train and get new jobs would generate benefits and relieve skill gaps.”

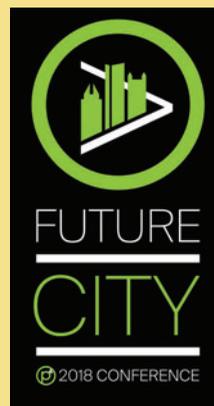
But compared to other industrialized nations, the U.S. invests little in “active” workforce development programs, such as training and programs to help workers search and prepare for jobs. The U.S. invested only 0.11 percent of gross domestic product in such programs in 2015, according to a report by the international Organization for Economic Co-operation and Development. Denmark, on the other hand, invested 2.1 percent of its GDP in similar programs.

“I believe we can manage these changes and end up increasing standards of living of more people,” Mr. Herzenberg said. “It’s a question of developing the political will to make the investment and enact policies.” **h**

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FUTURE CITY

Joshua Franzos



“Cities are the engines of national economies,” said Bruce Katz, a former Brookings Institution researcher who co-founded New Localism Advisors, a consulting firm. “They’re the centers of global trade and investment. But in this century, they’re also the vanguards of problem solving.”

One high-profile example of cities awakening to that role is the growing number committed to plans for reducing greenhouse gases and easing the threat of climate change. In particular, U.S. cities such as Pittsburgh are continuing to participate in the 2015 Paris climate agreement despite the Trump

Administration having decided that the nation won’t.

In Cleveland, the housing authority built a public housing community for grandparents raising children as their own. It’s a population that includes 3 million people nationwide who don’t fit well in traditional public housing designed to accommodate parents with children or seniors living alone.

“It was the first time I’d seen a housing authority that got it, that this was the new reality of how people were living in the 21st century,” Mr. Castro said.

In Flint, Mich., the state wresting management of the city away from local elected officials led to a four-year-old public water crisis. The state switched water supplies in the interest of austerity, but neglected to do the chemistry to prevent corrosion of lead pipes, exposing residents to dangerously high levels of lead in their drinking water.

“Flint is one of those places like many in the country where the ZIP code you were born in is the greatest predictor of where you’ll end up,” said Mona Hanna-Attisha, director of the Pediatric Residency Program at Hurley Children’s Hospital who discovered high lead levels in Flint’s children. “Children in Flint actually live 15 years less than children in a neighboring ZIP code.”

The crisis, she said, also demonstrated the community’s resilience and inspired residents to take action to fix the city’s problems. Flint is expected to be one of the first cities to replace all of its lead water pipes. A model public health program for children is being built, and new services, such as affordable early childcare and nearly universal pre-school, are emerging.

Another challenge facing all cities is a world transformed by artificial intelligence and other technologies that promise investment, jobs and wealth, but could eliminate occupations and worsen income inequality.

“The real promise of technology in cities is that it gives us a chance to double down on our humanity and come back to a central question of how cities can do what they’re good at, which is to support human flourishing,” said Jennifer Bradley, founding director of the Center for Urban Innovation at the Aspen Institute.

But economic benefits and opportunity don’t flow uniformly through neighborhoods.

That’s not by accident, said Andre Perry, a fellow at the Brookings Institution Metropolitan Policy Program who grew up just outside of Pittsburgh in the borough of Wilkinsburg. “The only reason we’re not seeing growth is because we don’t trust people in certain places,” he said. “When you invest in place and not people, you get gentrification.”

“There are 1,200 majority black places in the United States, small and large. Many of these places have assets that are underdeveloped, that people ignore until something goes wrong. There are entrepreneurs, there is real estate, and there is leadership that is ignored. We need to find what’s right and invest in those things.” **h**

The problems they came to discuss were national, even global, in scope and consequence: environmental threats; social and economic injustice; racism; and bracing for the impact of artificial intelligence and other emerging technologies that are transforming economies, work and opportunity.

The audience they encouraged to solve them was local—and for good reason.

“This conversation is happening in a moment when arguably cities are more important than they have been in our nation,” former U.S. Housing and Urban Development Secretary Julián Castro, pictured above, told the mostly southwestern Pennsylvania audience gathered in April for Pittsburgh’s p4 conference on sustainability.

“It’s very clear today that with the federal government and many state governments retrenching from support of things like education, health care, social services and housing, local [residents] must roll their sleeves up in the spirit of improving the community they all live in,” said Mr. Castro, who currently is the Dean’s Distinguished Fellow at the University of Texas Lyndon B. Johnson School of Public Affairs.

The former HUD secretary was among two dozen experts in fields ranging from economic development and design to public health, environment and social justice who shared their insights with local stakeholders interested in building the future of the City of Pittsburgh on principles of sustainability guided by the themes of people, planet, place and performance.

Mayor William Peduto embraced the concept in 2015. This year’s event was the third p4 conference convened by the city and The Heinz Endowments to help inform the city’s ambition to become a model of urban sustainability.

“We’re trying to raise the bar for the community in terms of benchmarking Pittsburgh against the rest of the world by bringing in people with different perspectives and challenging ourselves about what Pittsburgh can be and how we can seize our own future rather than have it happen to us,” said Andrew McElwaine, the Endowments’ vice president of Sustainability.

Cities represent 85 percent of the world’s gross domestic product and account for more than 50 percent of the world population. That percentage is growing as is the potential for cities’ influence.