We live in an age of uncertainty, a world with a population that is both ageing and growing. It is a world of climate change, of rapid economic transformation and of immense technological advances.

Most cities and regions have developed slowly—over many decades, if not centuries. But in order to survive in this fast-changing world, communities must now be able to adapt quickly.

So says Professor Chris Gibson, leader of the Global Challenges Program at the University of Wollongong, one of a small number of universities around the world that is harnessing research strengths to target the global challenges of the 21st century.

TRANSFORMING LIVES AND REGIONS
Ranking in the top 2% of universities worldwide, we are especially qualified to tackle these challenges having played a leading role in the transformation of our home town of Wollongong, one hour south of Sydney, to a city of the future.

Throughout the last century, Wollongong was Australia’s heavy industry heartland, best known as the home of the nation’s largest steel mill. The University was established to train the industrial chemists, metallurgists and engineers needed to keep these factories working.

But, although these traditions continue, our research is now helping turn Wollongong into a 21st century centre for technology. This includes innovations like the BioPen, which lets surgeons “draw” on damaged bone with an “ink” containing live cells.

Developed at the Australian Research Council Centre of Excellence for Electromaterials Science (ACES), which is headquartered at the University, the BioPen uses techniques similar to 3D printing to extrude cellular material between layers of gel. By delivering this material directly to the site of an injury, it can accelerate the regeneration of functional bone and cartilage.

The University of Wollongong was the first in Australia—and remains one of only five labs in the world—to fabricate silicene, a new two-dimensional material. Structurally similar to graphene, but made of silicon instead of carbon, silicene has intrinsic semiconductor properties that graphene lacks.

These properties could help it revolutionise materials science, leading to smaller, faster computer chips and more practical and efficient solar cells, as well as improvements in medical technologies and vehicle and aircraft parts.

Having demonstrated our expertise through achievements like these, we are now focusing our efforts on three Global Challenges—areas in which we can make the greatest impact: the ageing population, the growing pressure on marine and coastal environments, and the changing nature of manufacturing and industry.

“We have taken an innovative approach to our research, concentrating on three challenges and then marshalling multidisciplinary resources and expertise from across the University to work on research projects under each challenge,” Professor Gibson says.

MANUFACTURING INNOVATION
Taking advantage of Wollongong’s history as a region of industrial creativity, we’re already tackling the puzzle of what we should be making in Australia and how we should be making it. This means exploring the potential of the broadband-powered digital economy and the possibilities of smart materials, robotics and automation, as well as innovative medical devices.

It’s also where we use our strengths in 3D printing and additive manufacturing to create results that were previously not feasible—such as custom-printed flutes that can play microtonal scales, or the notes between notes.

After bringing together economists, planners, social marketers, creative artists and designers to work on projects, we have initiated a global benchmarking exercise to ensure we are operating at best practice in these novel manufacturing techniques in our local region.

SUSTAINING COASTAL AND MARINE ZONES
Through our international collaborations we’re seeking to improve the sustainable management of fish stocks, like bigeye and yellowfin tuna, that are under pressure from fishing fleets. This project, run through the Australian National Centre for
Ocean Resources and Security, will help to deliver the food security needed for social stability in Pacific island nations that face declining fisheries.

We’re also harnessing social media technology to build resilience to climate change-induced extreme weather events in South-East Asian megacities. PetaJakarta uses real-time data from 150,000 Twitter users in Indonesia’s capital to track and analyse flooding and inform emergency services and residents.

Our SMART Infrastructure Facility, which runs the project, was one of only six research institutions in the world to receive an inaugural Twitter Data Grant and gain access to this vital information.

“Regions all over the world are facing common challenges, and it is important that from an empirical basis we develop tailored outcomes that have a global impact,” he says.

The Global Challenges Program shows how we’re playing a significant role in transforming lives and regions for the better.

To learn more, visit globalchallenges.uow.edu.au.

UNIVERSITY OF WOLLONGONG
A dynamic Australian university with a strong research focus, located just an hour from Sydney’s International Airport.

CURRENT RANKINGS
◆ Top 2% of world universities (The Times Higher Education, QS, Leiden and Academic Ranking of World Universities)
◆ Top 100 for global graduates (QS Graduate Employers Survey)
◆ Five stars (QS World University Rankings)
◆ 1st in Australia for Educational Experience and Graduate Outcomes (Good Universities Guide)
◆ 22nd and 33rd in The QS and Times Higher Education rankings respectively for the world’s Top 100 Universities under 50 years of age.
◆ 2nd (relative to size) and 8th on total research funding awarded nationally.

KEY NUMBERS
◆ 31,500 students
◆ 12,800 international students
◆ 1,520 higher degree research students (893 domestic; 627 international)
◆ 138 nationalities represented in student body
◆ 2,350 staff
◆ 476 degree courses.

RESEARCH AND COLLABORATION OPPORTUNITIES
◆ Record $49.1 million in Australian Research Council (ARC) funding announced in 2013
◆ Postgraduate scholarships
◆ Multidisciplinary PhDs
◆ Vice-Chancellor’s Postdoctoral Fellowships
◆ Visiting academic appointments
◆ Study leave and sabbaticals
◆ Financial assistance for international exchanges
◆ Joint PhDs with overseas universities.

LEARN MORE
Visit: www.uow.edu.au
www.uow.edu.au/research
Facebook.com/UOW
Twitter.com/UOW
Phone: +61 2 4221 3555

CAMPUSES
◆ Two campuses each in Wollongong
◆ Two campuses each in Wollongong and Sydney, and regional campuses in the Shoalhaven, Batemans Bay, Bega and Moss Vale
◆ University of Wollongong in Dubai.

LIVING WELL, LONGER
By taking a holistic approach to the problem of an ageing population—considering physical and mental health as well as access to services—we’re discovering the physical and mental requirements for a long, healthy and high-quality life.

Our research is making a real impact on dementia, which is expected to affect one million Australians by the middle of the century. Two dementia-friendly communities that we’re designing and piloting will not only accommodate but also actually welcome people who suffer from this debilitating illness.

And we’re bringing together doctors, psychologists, geneticists, paediatricians, obstetricians and social scientists to follow three generations of local residents to understand their patterns of mental health and wellbeing as they age.

Professor Gibson says these collaborations capture the power of the University’s multidisciplinary research capacity.