tally from 2001, according to Universities Australia, an association that represents the nation's institutions. "Not all of them are going to end up teaching at a university. We have to find a way to put them into the broader economy," Sheldon adds.

The intern programme also addresses a lack of collaboration between academia and industry, Sheldon says. "We do research really well," he says. "But when you look at transferring knowledge, we're stone-cold last." Inserting PhD students into companies can only help to encourage collaboration, he says.

Internships in some fields have a reputation for being a source of cheap or even free labour for employers. According to the non-profit group Brussels Interns NGO, often known as B!ingo, more than half of all student internships in Europe are unpaid, and some PhD students do end up taking unpaid positions, especially in conservation and ecology (see *Nature* **522,** 131; 2015). But many PhD interns in the sciences are compensated for their time and efforts. The AMSI interns, for example, receive a stipend of Aus$3,000 a month. Treharne says that she continued to receive her usual stipend through the UK Natural Environment Research Council (NERC) while she interned at BirdLife International. "That was crucial," she says. "Otherwise I couldn't have done it." The site glassdoor.com, which collects salary data for many companies, suggests that Google interns generally earn in the range of US$6,000–$7,000 a month.

"I'd be much more worried about what I was going to do if I didn't have the contacts that I have now."

Students also need the blessing and support of their home institutions before they can take time off for an internship. Treharne says that both the University of Sheffield and NERC made it easy for her to put her PhD work on hold. Mathewson says that he had to take the initiative. "It took a little bit of perseverance and self-motivation to find a position and connect with a company," he says. But once he was offered an internship, his supervisor and the university were accommodating, he says.

Mathewson says that, as is the case for many students, the lessons from his internship will help to power him through his PhD — and beyond. "People at Google are productive and know how to use their code and pipelines in a way that I hadn't seen before," he says. "I'm learning incredible practices." ■

Chris Woolston *is a freelance writer in Billings, Montana.*

BOSTON CHILDREN'S HOSPITAL

TURNING POINT
Data miner

Harvard University epidemiologist John Brownstein was always interested in health, but rather than heading to medical school, he decided to wed his interests in ecology, statistics, geography and computer science to predict disease dynamics. Brownstein, who is also chief innovation officer at Boston Children's Hospital in Massachusetts, has partnered with Google and Uber to harness new data sources.

You opted out of medical school. Why?
I spent a semester in east Africa while I was an undergraduate student at McGill University in Montreal, and I saw how closely the environment is tied to health. It reinforced my interest in working out how to bring multiple fields together to understand the health of populations. I got my PhD in epidemiology at Yale University in New Haven, Connecticut, researching the impact of climate change and landscape transformation on Lyme disease, West Nile virus and other infectious diseases. I also spent time at NASA and realized that there was a huge opportunity to explore satellite imagery and other data sets in epidemiology.

Where did those ventures lead?
Recognizing that I was interested in population health and disease surveillance, I got excited by large data sets, such as electronic medical records, that could model infectious-disease dynamics. When I came to Harvard and Boston Children's Hospital, I began modelling adverse drug events and influenza in patient populations and turned to the Internet where data was much more available at large scales. I developed a research team to harness data to track disease, and we created HealthMap, a public-health website that mines the Internet for signs of disease outbreaks.

Describe your first forays into industry.
There were commercial opportunities around the data-mining technologies we created. We spun off a company called Epidemico, which monitors conversations on social media and elsewhere for insights into disease outbreaks, food and drug safety and patient experiences. I also founded a company called Circulation, which works with Uber to get patients to medical appointments.

How did you link up with Uber and Google?
These connections don't just drop out of the sky. With Google, we had an intern at Boston Children's Hospital who'd been at Google before and was able to produce the right connection there. We got in front of the right people, pitched to them and won what turned out to be seven years of funding. With Uber, we responded to a request for feedback on a trip receipt. We said that our ride was fine but that they should consider expanding their market to those who need health care. They responded and we ran a campaign called UberHealth, which experimented with delivering health-care services, such as flu vaccines.

Any advice for early-career researchers who want experience at big technology companies?
I've always found that the more a person can refine the research they are interested in, and target people at companies that have those same interests, the higher the rate of success. It's important to find a way to personalize enquiries. A vague one-line e-mail doesn't offer the recipient much to follow up on. At the same time, nobody's unreachable. If you have a story that is compelling and connects you to the person you want to reach, it makes all the difference. The worst that could happen is that you get no response. Also, don't forget about the many available internships at smaller start-ups that are trying to solve one particular problem.

Are academics reluctant to approach industry?
Yes. Most of them wait for a formal request from potential funders. I don't think people in academia realize that they can create their own funding opportunities. You don't have to go through a structured fellowship application and be one of a thousand applicants. You can talk to a person in industry and come up with a proposal in which you are the only applicant. ■

INTERVIEW BY VIRGINIA GEWIN

This interview has been edited for length and clarity.