



PHOTOGRAPHY GARETH GAY

# A VISIONARY EDUCATOR

MIT President Rafael Reif likes to think big. Besides being involved in bringing free online university courses to the world, he helps industries innovate, collaborates with educational institutions abroad, and has his eye on solving global sustainability problems.

STORY **JOYCE LAU**

“Water is the next oil. People will go to war to fight for [access to] water.”

Professor Rafael Reif, the head of the Massachusetts Institute of Technology (MIT), did not mince words during a recent visit to Hong Kong. Like all university presidents on trips abroad, Reif was in the region to meet academic VIPs, address alumni and drum up fundraising. (His visit included Singapore and Taiwan.) But he also pushed on issues close to his heart, like water pollution, food security and green energy.

The 64-year-old electrical engineer – now the president of one of the world’s pre-eminent research universities – is known for bringing MIT into the broader world through online education, international outreach, innovation and a focus on social responsibility. A plain-spoken man from a humble background, he is not shy about criticising the pollution caused by industry and technology.

“I’m looking for partners to solve world challenges,” he says during our interview at the Conrad Hong Kong Hotel in November, during a day packed with meetings. “We want to bring the MIT model and apply it globally. Take the issue of fresh water – there must be people who want to work on that.”

## A LONG JOURNEY

Reif was born in 1950 in Maracaibo, a city near Venezuela’s oil fields, the youngest of four brothers in a



Yiddish-speaking immigrant family.

His Eastern European Jewish parents fled Europe in 1938. A few months later, all the Jewish people at the place where they had been “were taken to a ghetto and then to the camps,” he says of his family’s escape. (In a sign of how turbulent Europe was, both of his parents were born in states that no longer exist – his father in the former Austro-Hungarian Empire and his mother in a place that became part of the former Soviet Union.)

They started at the bottom in Maracaibo. “They scraped by to make a living,” Reif recalls. “At least in terms of material goods, we were poor.” The family moved

to the capital, Caracas, where Reif completed high school and started university. However, because the government closed the university he was attending, he moved to Valencia, where he earned his undergraduate degree in electrical engineering from Venezuela’s Universidad de Carabobo in 1973.

Academic standards at Venezuelan institutes were no match for where he was heading: Stanford University. Reif admits he had a “hard time” initially as a post-graduate student there.

When he made his first trip to the United States, he had never been outside of Venezuela except for a brief trip to a nearby island. But

**FROM LEFT**  
Rafael Reif, president of the Massachusetts Institute of Technology, and its main campus in Cambridge, Massachusetts.



the young man found himself on a plane to Miami and then Chicago, and landing in sunny Palo Alto, California, on Labor Day weekend, 1974. He spent that weekend “desperately looking for a place to stay.” His grasp of American culture was so sketchy that he did not realise that the first Monday in September is part of a holiday weekend in the US. “On Monday, I went to the university and it was completely empty,” he recalls. Not that he was bothered by it. “I thought I was in paradise,” he says of his first look at Stanford. “I remember walking around campus and thinking, ‘My God, this place is so beautiful.’ I’d never seen buildings like that.”

Reif had originally intended to return to Venezuela, where he hoped to use his US education to become a professor in his homeland – but America kept throwing up new opportunities. After he finished his master’s at Stanford, the university asked him to stay on to do research. He ended up completing his doctorate in electrical engineering there.

He was then recruited by MIT. “I thought, ‘Let me spend a short time there,’” Reif says. That was in 1980 and he never left; he became MIT’s provost in 2005 and president in July 2012.

Nate Nickerson, MIT’s associate vice-president for communications, who accompanied Reif on his recent Asia trip, sees a link between the president’s hardscrabble background and his work on opening up learning at MIT to a broader public. “When I think of Rafael and education, I think of accessibility,” Nickerson says. “He grew up poor in Venezuela. His life journey is inseparable from his vision. There’s a beauty to his story.”

#### EDUCATION FOR ALL

MIT and Harvard were pioneers in developing a platform called edX, which allows anyone with an internet connection to access lectures from some of the world’s



PHOTOGRAPHY DOMINIC REUTER

### “HOW MANY MORE IN THE WORLD WOULD BE CAPABLE, AND COULD BENEFIT FROM MIT PEDAGOGY?”

- Rafael Reif, MIT

top universities. A nonprofit enterprise, edX has drawn more than three million users and offers nearly 400 massive open online courses (MOOCs).

EdX started offering courses in 2012. But its roots in online education at MIT go back further, when some coursework began being posted to the MIT OpenCourseWare platform in 2002. Reif became aware of the need to redesign online education in the mid-2000s, when he was MIT’s provost. (At the time, Susan Hockfield – the first woman to hold the post, whom he succeeded in 2012 – was president.)

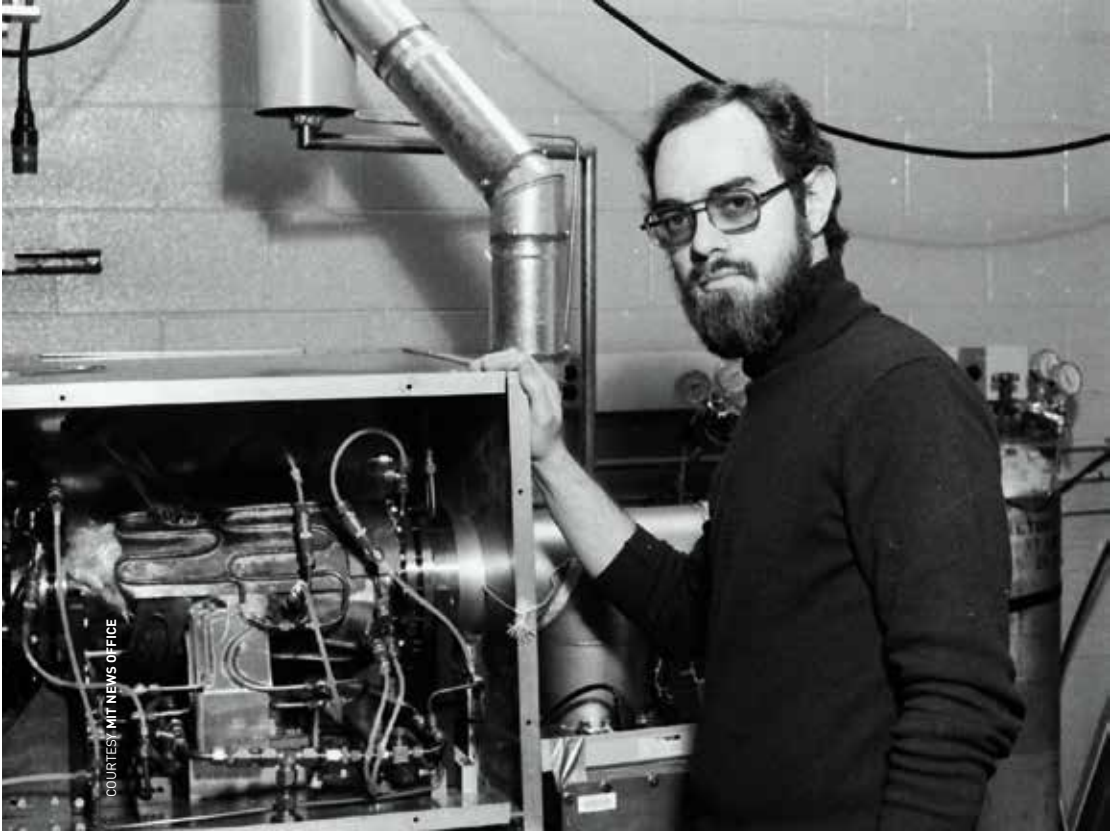
“Something unusual happened,” Reif says of his time as

provost. “Professors were telling me to do something about their students not going to class.”

MIT focuses on “learning by doing” – and some students would rather spend time on their own projects than show up for lectures. “Students were doing things, meeting in groups [working on projects] and then when it was time to go to class, they would say, ‘Well, this stuff is online anyway.’

“MIT kids are very smart and can learn many things on their own,” Reif says. “We needed to spend more time guiding them. We created a more tutorial approach.”

The first MIT course to go live on edX was “Circuits and



COURTESY MIT NEWS OFFICE

**FROM LEFT**  
Rafael Reif congratulating an MIT graduate; Reif in his lab at MIT, circa 1982.

Electronics – 6.002x”. MIT thought it might draw a few thousand curious onlookers from outside campus. In fact, almost 155,000 people registered. Of those, more than 7,000 non-MIT students actually passed the whole course.

Nickerson says they were surprised by the numbers. “It’s really hard,” he says of the circuits class. “You need to understand differential equations. This is ‘MIT accessible’ but not ‘MIT lite’.”

MIT has been taking things further, breaking down edX data to quantify how people study, looking at questions such as: How many times does the average student watch the same video? Do they need to rewind and slow down? How do they do on the quizzes? For how long can they concentrate?

The push for online education comes from a belief that there are many more MIT-capable students in the world than they could ever physically fit on its century-old campus in Cambridge, Massachusetts.

Every year, close to 20,000 high school students apply to be freshmen at MIT, which only has room for about 1,000 or so. Reif estimates that about half of those applications would actually be capable of handling MIT-level work (but this does not mean they can all be accepted), so the institute essentially turns away 9,000 qualified students a year.

Neither Reif nor Nickerson seem to take any pride or joy in MIT’s exclusivity. “We’re not happy about that,” Nickerson says about the number of talented students turned away. “How many more in the world would be capable, and could benefit from MIT pedagogy?” Reif adds.

Like many elite universities, MIT’s admissions are “need-blind”, meaning they accept students regardless of whether they can afford tuition, and also offer generous financial aid.

However, MIT can only afford this system because it is among a small number of historic

### MIT HAS BEEN TAKING THINGS FURTHER, BREAKING DOWN EDX DATA TO QUANTIFY HOW PEOPLE STUDY

institutions with large endowments, supported by generations of wealthy alumni. Reif is keenly aware that not every college can afford this luxury, and that not every capable student will be given his or her best chance to succeed.

#### INDUSTRIAL INNOVATION

Reif has also been trying to solve economic and technology-related problems far beyond the ivory tower. In September 2013, President Barack Obama appointed Reif as co-chair of the Advanced Manufacturing Partnership Steering Committee, which aims to “create high-quality manufacturing jobs and enhance America’s global competitiveness,” according to a White House statement.

“The basic premise is how do we innovate better across the United States?” Reif says. He adds that part of that effort should include a more open immigration policy.

Reif’s view has probably been shaped by his own experiences and by MIT’s extraordinarily



diverse campus. About half of its undergraduate student body is made up of ethnic minorities – with the largest chunk coming from the Asian-American community. Meanwhile, about 40 per cent of graduate students and 40 per cent of faculty members were born outside the US.

“There are concerns about brain drain,” Reif says. Leaders in technology and politics, from Silicon Valley to Washington, have criticised how difficult it is for some top foreign graduates to stay in the US to work or start businesses.

“They do extremely well,” he says of foreign students at MIT, adding that policies should keep talent in the country. “Otherwise, people who are the same as I was would not be able to stay,” he says.

Reif also has a global view when it comes to improving industry. The new race to succeed internationally would be in “smart manufacturing”, and not in mass production (with its old-fashioned assembly lines), which has long since moved from rich Western nations to developing Asian economies.

Asked to explain what that means in layman’s terms, he quips: “Low-wage manufacturing means lots of people. Smart manufacturing means lots of robots.”

As an example, he cites Taiwan. “You see football fields worth of manufacturing with no people,” he says. “That’s a paradigm shift.”

ASIAN TIES

Several major American universities have recently opened Asian branches. For example, in 2013, classes began at New York University’s new Shanghai campus.

However, MIT has not gone down this route, preferring instead to lend expertise and support to foreign institutions. “MIT itself would be hard to replicate,” Reif says, when asked whether it would build an Asian arm. He says he would rather help overseas



institutions than ‘cut-and-paste’ the MIT name, comparing the former to two parents conceiving a new child, and the latter to one parent cloning himself.

“If a nation or society wants to establish an institution with MIT DNA – education, research, innovation – we are more than happy to help. We [can] design the curriculum. We [can] set it up for them.”

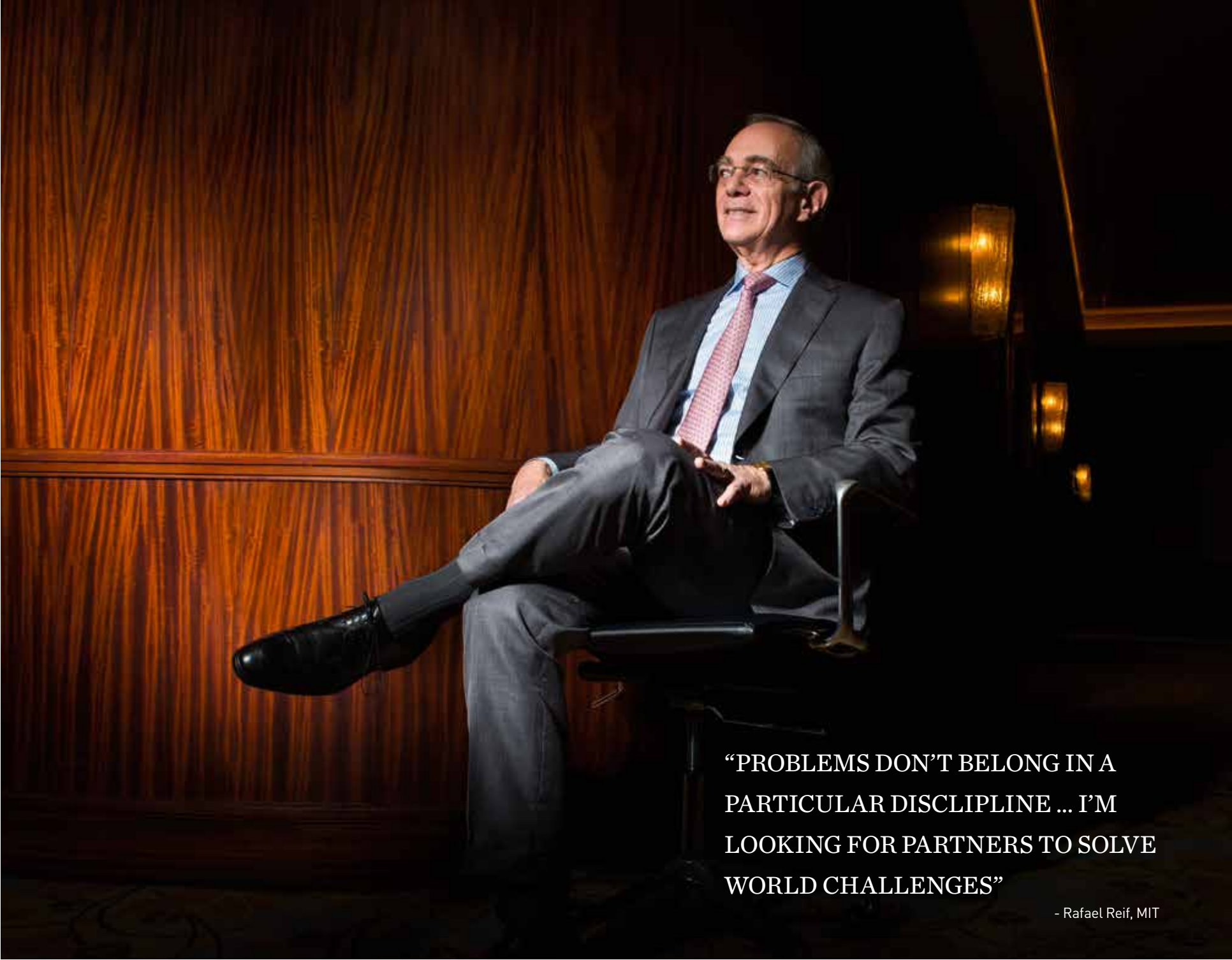
MIT helped launch Moscow’s Skolkovo Institute of Science and Technology, or Skoltech, in 2011. It also helped develop the Singapore University of Technology and Design, which opened in 2012. In the same city-state, MIT helps run the Singapore-MIT Alliance for Research and Technology, or Smart. Earlier, MIT supported the development of the Masdar Institute of Science and Technology, a graduate school established in 2007 in Abu Dhabi.

MIT has strong ties with Asia, where it has a large number of alumni living or working in the region. In Hong Kong, they include Financial Secretary John Tsang, Victor Fung of Li & Fung, David Wong of Dah Sing Bank, Marjorie Yang of the garment giant Esquel Group, and Professor Helen Meng of the Chinese University of Hong Kong’s Engineering Department.

In China, MIT alumni who went on to become internet pioneers include Joe Chen of Renren and Charles Zhang of Sohu. When Reif addressed the MIT Club of Hong Kong in November, former students flew in from the mainland, Taiwan and Japan.

Ken Yeung, CEO of the TOM Group, is also president of the MIT Alumni Club of Hong Kong. In many ways, his experience at MIT was not unlike Reif’s, or that of other foreign students. Yeung visited the US for the first time on scholarship. “I was 17 years old and, at that time, Hong Kong was not as well to do as now,” Yeung says. “I’d never been overseas.” He graduated from MIT with a bachelor’s degree in electrical engineering in 1988 and a master’s degree in electrical engineering and computing in 1989 – both with a 5.0 GPA (grade point average), the highest possible mark. While on campus almost 30 years ago, Yeung already had access to an early form of instant messaging called Telnet and saw an early form of HDTV.

Yeung met Reif for the first time at a Hong Kong dinner in March 2012, when Reif was still provost. “My first impression was that he is a very easy-going person,” Yeung says. “He’s funny. He talks about personal things, like his kids. You don’t expect that.” To Yeung, Reif seems more like a passionate



“PROBLEMS DON’T BELONG IN A PARTICULAR DISCIPLINE ... I’M LOOKING FOR PARTNERS TO SOLVE WORLD CHALLENGES”

- Rafael Reif, MIT

LEFT Rafael Reif and other academic leaders from MIT and Harvard at the edX announcement day in May 2012 .

PHOTOGRAPHY DOMINICK REUTER

PHOTOGRAPHY GARETH GAY

professor than an administrator. “He’s from MIT himself,” Yeung continues. “He’s been there 30 years. That means something.”

At the recent alumni gathering in Hong Kong, Yeung says Reif brought up the issue of providing clean water to the world’s growing population. “He’s very concerned about water, energy and health care,” Yeung says. “It’s very inspiring to listen to.”

GLOBAL CHALLENGES

Reif is determined to cross borders – both national and those that define academic disciplines – to solve social and environmental

challenges. “Problems don’t belong in a particular discipline – they are problems,” he says. “You’re trying to solve problems bigger than yourself. I’m looking for partners to solve world challenges.”

Reif mentions a range of aims, including how to use technologically advanced early disease detection to improve health care and cut medical costs. The solution, he says, could come from experts in fields as diverse as biology, engineering, medicine and computer science.

But his main goals seem to be related to ecological concerns, particularly water. In 2014,

Mohammed Abdul Latif Jameel, an MIT alumnus from Saudi Arabia, gave a donation to MIT that allowed for the creation of the Abdul Latif Jameel World Water and Food Security Lab, or J-WAFS.

“As population grows, we need more energy. More energy needs more water,” Reif says. “We need more food, and food requires water. The population itself needs water. The majority of the world doesn’t have enough water.

“The solutions are regional – the solution China needs is different than what the Middle East needs. We need the world to work together,” he adds. ☯