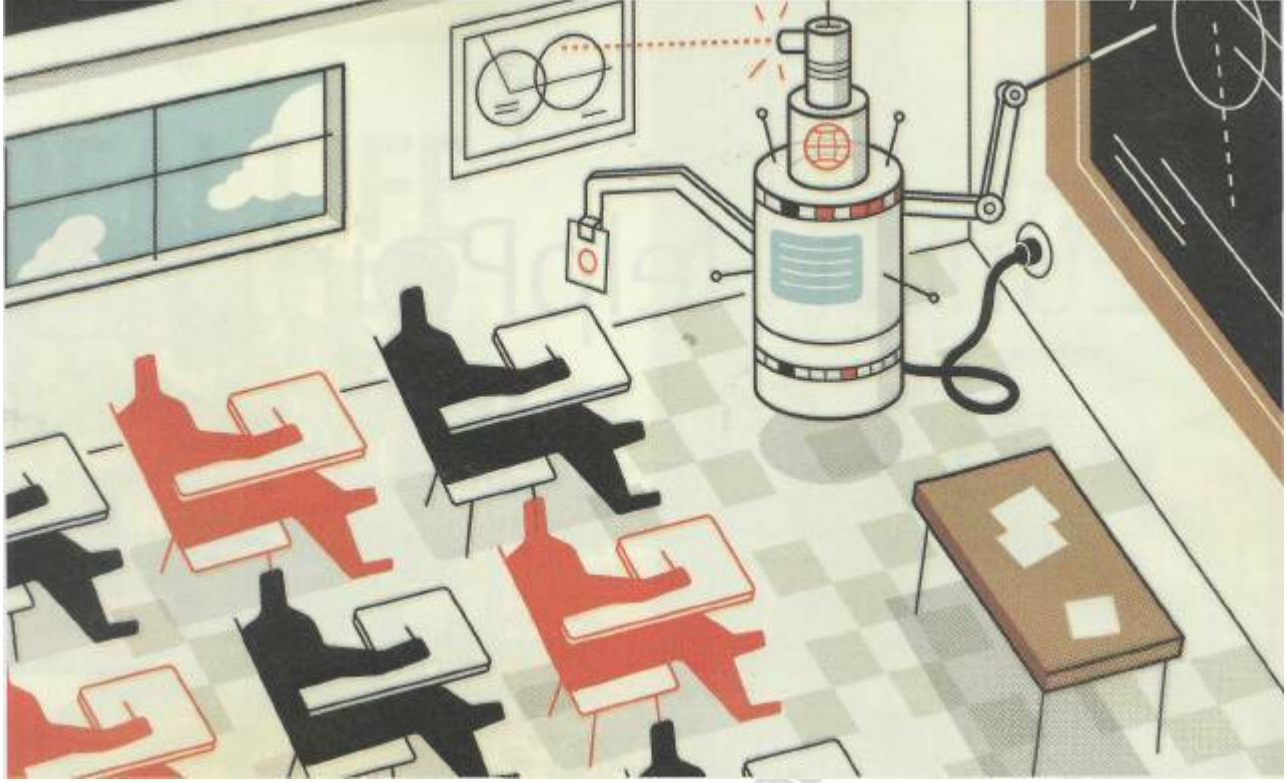

THE SCHOOL OF FUTURE KNOCKS

Singularity University offers crash courses in how to prepare for disruptive technologies in years to come

By Ellen Gibson

Bill Gates calls him "the best person I know at predicting the future of artificial intelligence." Computer scientist Douglas Hofstadter classifies his ideas as "the craziest sort of dog excrement."

Ray Kurzweil is no stranger to controversy. For more than a decade, the inventor-turned-author has been issuing predictions about superhuman cyborgs and biotech-based immortality that border on science fiction. Yet Kurzweil's theories continue to gain traction among mainstream techies, and they are also making their presence felt in corporate boardrooms. The latest vindication: Google and NASA are backing a new university modeled on his ideas, with additional funding from X Prize creator Peter H. Diamandis.

Dubbed "Singularity University" and housed at NASA Ames Research Center in Mountain View, Calif., the institute will feature intense 3- and 10-day workshops to help senior executives steer their companies into the future. Announced at the Technology, Entertainment, Design (TED) conference in February, the school has recruited top-tier faculty, including Vint Cerf, Google's chief internet evangelist, and Jim Karkanias, a research director at Microsoft. And among the students inquiring about the first executive classes this fall are venture capitalist Heidi Roizen and Judy Estrin, former chief technology officer of Cisco Systems.

Some of the topics discussed in class would feel right at home at a Star Trek convention. Take the name of the new institute. In astrophysics, "singularity" refers to conditions on the far side of a black hole. But it was Kurzweil who gave the term new resonance in his 2005 best seller, *The Singularity Is Near*. Here, it designates a point in the not-so-distant future when artificial intelligence will outstrip human brainpower and ingenuity. (Think IBM's Deep Blue vs. Kasparov, on a planet-wide scale.) In Kurzweil's best-case scenario, man will merge with machines via tiny robotic devices implanted in our bodies and brains, extending our lifespans and vastly enhancing our mental prowess. Bionic brains, Kurzweil says, will make short work of the world's intractable problems, from climate change to drug-resistant diseases.

The school's mission isn't to indoctrinate students with Kurzweil's futurology—or even grant degrees. Instead, it's to help them grasp the implications of fast-changing fields

such as biotechnology and robotics. Graduate and postgrad students will have nine weeks to absorb these lessons, while accelerated classes for C-suite teams will provide an overview of how disruptive technologies trample existing industries and forge new ones. Executives will be placed in small groups for focused peer-to-peer engagement. For example, the CEO of a company that makes silicon-based solar cells will be in a group that explores the impact of exotic new materials. Managing intellectual property, of course, is part of the core curriculum.

"We're going to be focusing very much on the science, not the science fiction," says Salim Ismail, the university's executive director and former product development chief at Yahoo! Five years ago, people might have been shocked to hear that ink-jet printing could be used to assemble living cells into artificial organs. "Today they're close to getting prototypes working in labs," he says. "What will we see in the next five years?"

FAST AND FAR-REACHING

Borrowing from microelectronics, Kurzweil uses the paradigm called Moore's Law to show that the singularity isn't just plausible but inevitable. Simply put, it states that the power of semiconductors doubles every two years. Engineers have repeatedly declared the end of this cycle, only to see computers grow more and more powerful. Turning to biology, Kurzweil notes that it took 15 years to sequence the HIV virus. In 2003 scientists took less than a month to sequence the newly emerged SARS virus.

Societies, meanwhile, are adopting technology more rapidly with each passing generation. Telephones required half a century to become ubiquitous; cell phones pulled off the same feat in just 8 years. As the time frame for such developments collapses, the advances themselves grow more disruptive, and their impact increases exponentially. "As leaders of companies, we're focused on the day-to-day, and we don't take time to pull back and think about the technologies that are going to rock our world," says Diamandis. "It's how automobiles caught buggy manufacturers blind."

Yet not everyone is convinced the world needs Singularity U. Prominent scientists have questioned many of Kurzweil's ideas—from the assumptions of exponential technological progress to the ability of neuroscientists to reverse-engineer such a complex a structure as the human brain. Some tech bloggers have derided the institute as a playground for Silicon Valley types with too much time and money. (A 10-day executive course is expected to cost $15,000.) On his CNET blog, tech analyst Peter Glaskowsky predicts the curriculum will be "a painful muddle of science and science fiction identifying no clear path to a future we might not even want."

Many take the endeavor seriously, however. Stephanie Langhoff, chief scientist at NASA Ames, signed up as a faculty adviser. And grad-student applications for this summer's pilot program have poured in from more than 60 countries, leaving administrators struggling to cull applicants. Lots of executives have expressed interest, too. Says Ismail: "If CEOs are not asking themselves big questions about how rapidly accelerating technologies apply to their business, you have to start asking them some questions."

THE RETURN ON RESEARCH

HP's R&D productivity index shows which projects have the biggest payoffs

By Cliff Edwards

Business leaders are often vexed by research and development spending. How much money do you put into R&D when it could be 10 years before you see a payoff as products hit the market?

Hewlett-Packard CEO Mark Hurd has pushed hard to take guesswork out of the equation. Since arriving at HP four years ago, he's developed one of the most quantitative approaches to R&D in the tech industry. The strategy has helped HP keep its footing during the economic downturn, even as rivals like Dell have struggled. "They have the gold standard," says James Andrew, head of the global innovation practice at Boston Consulting Group.

The key is linking R&D spending to specific product lines. Of the $3.5 billion that goes into HP Labs, the company allocates the money based on where it expects the biggest payoffs. To standardize across a product line that includes everything from printer ink to giant server computers, HP uses a metric it calls "R&D productivity," which is research spending as a percentage of gross margin. A standard desktop computer with low margins may get one or two innovative features. But a laptop, with fatter margins, would get more flash, such as touchscreen technology and cool design materials. "We try to focus a bigger percentage of our overall budget on game-changing types of technologies," says Hurd.

CEO Hurd puts more of the budget on "game-changing technologies"

HP's investments in things like multi-touch technology have helped it surpass Dell as the world's top PC maker. Hurd says more standout technologies are on the way, including gesture-based controls, so you can point at your PC to launch a music or photo program. "We [are] trying to get innovation to the highest level we can," says Hurd.

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