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PEOPLE p. 19 Altran provides its clients with "IS" guidance/ **Campus** The École centrale of Beijing, a very ambitious project

september 2006 **N° 10**

ALTRAN'S
SCIENCE AND
TECHNOLOGY
MAGAZINE

Altitude

THE REPAIRED BODY

TEN YEARS OF EXPERIENCE, TEN YEARS OF SERVICE, TEN YEARS OF CITIZENSHIP

I am very pleased that the 10th issue of Altitude is devoted to the theme of repairing the human body, in connection with the Altran Foundation for Innovation's choice of mending the human body through technological innovation as the focus of its 11th Award. It is a gripping theme, one that touches all of us and raises difficult ethical questions but that is highly appropriate in a society mobilising all its resources to improve quality of life.

I am also overjoyed that the Foundation is celebrating its 10th birthday this year - 10 years of innovation, of technological abundance, and indisputable success in the service of humanity. Such success is above all the product of the dedication and hard work of men and women both in and outside the Group. For 10 years now, they have shown their investment in the Foundation's goals by helping to promote its activities in diverse ways. For them, it is an extraordinary professional and personal opportunity to take part in providing solutions for the world's most pressing concerns.

The Foundation is inviting this year's Award candidates to partner with Group consultants during the selection process, giving our experts a chance to use their professional skills "outside the box" and, in doing so, to serve society's best interests.

We're looking forward to seeing you in a year when we announce our winner, and who knows? It might be someone you yourself picked out! I have no doubt that the ceremony will testify, yet again, to the Group's pivotal presence at the heart of a changing society.

Christian Le Liepvre
Operations Manager, Altran Foundation for Innovation

NEWS 04



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Altran works with the ESA on the Eurobot project to reduce risks encountered by astronauts during extra-vehicular activities at the International Space Station.

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Rudy Van der Blom's Maxxun project has received the 2006 Award for "Technological innovation and energy".

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Now you can really lounge in the grass! Grow an armchair in your lawn.

HIGH-TECH 11



> 11 THE REPAIRED BODY

Today, medicine relies heavily on biotechnology, nanotechnology, and information technology. So-called "hybrid" patients complement their bodies with machines, while healthcare professionals learn through virtual reality. There's no doubt that the medico-technological revolution is well under way... but how far will it go?

PEOPLE 19



> 20 ALTRAN PROVIDES ITS CLIENTS WITH "IS" GUIDANCE

Information systems (IS) are so prevalent in companies that they can deeply impact their daily operations and growth plans. Through Altran CIS (Consulting and Information Services), which brings together the various subsidiaries in the industry, the Altran Group provides its clients with information systems guidance.

> 22 GILLES GLEYZE

What's the ambition of the École Centrale of Beijing? The explanation of École Centrale's development director in Paris.

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DISABILITIES

A SEEING MACHINE

Elizabeth Goldring doesn't have the background you'd expect of an MIT (Massachusetts Institute of Technology) researcher. Working in MIT's laboratories, Goldring, an artist and poet, developed a "seeing machine" that helps visually impaired people to see by projecting images onto their retina. After successfully testing the machine with 10 visually impaired subjects, Goldring and her colleagues have published their findings in Optometry, the Journal of the American Optometric Association. Goldring, who has impaired vision as a complication of her diabetes, has been working on the project for the last 10 years. The machine she developed costs \$4,000 (€3,200), as opposed to the \$100,000 machine that inspired it! The machine, which is used on one eye, opens up numerous possibilities for the visually impaired, from surfing the web to recognising a loved one's face to preparing for a visit to a new place. All in all, a glimmer of hope in a darkened universe.



Clement Perrotte

ALTRAN FOUNDATION

BCI: PUT ON YOUR THINKING CAPS

"I am so proud to have been a part of and helped with this extraordinary medical invention. I think that allowing someone to communicate with the world around them is one of the most beautiful things we can give," says Mark Manasas of Cambridge Consultants Inc. The Altran Foundation for Innovation's 2005 Award went to the BCI (Brain Computer Interface) project in the United States. The project is an electronic cap which allows paraplegics and other victims of paralysis to control a computer, and thus communicate with those around them, simply by thinking. Jonathan Wolpaw and the Foundation made finding a way for patients to use the BCI

technology at home the goal of Altran's partnership. In cooperation with other Altran consultants, Mark made using the technology easier in a number of ways:

- They developed a smaller, lighter system.
- They developed a new cap that was both lighter and higher performing.
- They improved the electronic measuring chain.
- They developed new programs which save data and interface with contemporary office desktop software.

In April of 2006, for the first time ever, a patient composed and sent an email on his own. The BCI/Altran team is thrilled with the success of this partnership.

ENERGY

THE GREAT WALL OF CHINA: PART II

The Three Gorges Dam in China was filled for the first time on June 13th, 2006. It took thirteen years to complete the 2.3 kilometre long and 185 metre wide dam, the largest of its kind in the world. Its 26 turbines will be fully operational in 2009.

ALTRAN EUROPEAN COMMISSION

ALTRAN REFLECTS ON EUROPE'S ENERGETIC FUTURE

After the dossier on green homes published in the last issue of Altitude, the European Commission invited the Altran Group to consult on the Green Paper on Energy Efficiency, whose closing date is September 24th, 2006. Find out about Altran's input at http://ec.europa.eu/energy/green-paperenergy/index_en.htm

ALTRAN

EMPLOYEES WITH A SPRING IN THEIR STEP

Spring, Altran's first employee shareholding programme, saw positive results in the months following its close, in large part thanks to Springers, the people who worked to enable the success of the project. Their dedication, motivation, and care helped to get everyone involved in Spring and to make it a victory. A big thank you to them!

ALTRAN INFORMATION SYSTEMS

EUROSPORT GOES TO CHINA WITH ALTRAN

Work with European teams to put together a website from scratch for Eurosport – in Simplified Chinese? Miao Zheng was the ideal woman for the job: no one but this Axiem (Altran Paris subsidiary) consultant could have pulled it off. The project, which was spread out over three months and more than twice as many time zones, was carried out successfully thanks to internal know-how and the support of a local host and a Beijing-based editorial team. Miao is looking forward to hearing her compatriots' reactions to the site. "The Chinese are crazy about football," she says, "so the site launch will be very interesting!"



Image forum

TRANSPORTATION

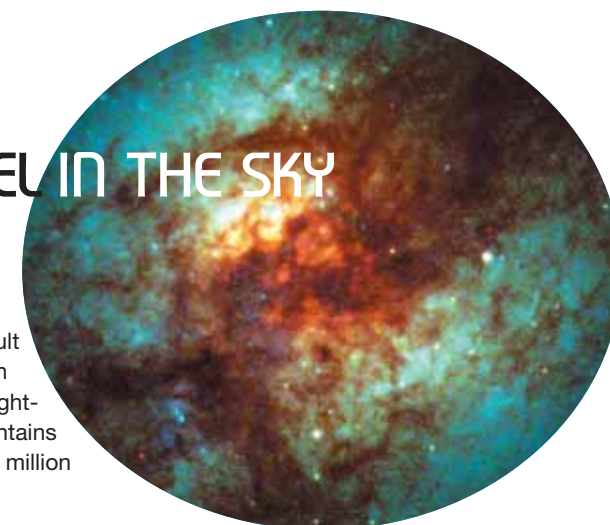
A BIG KIDS' TRICYCLE

A research team at the University of Bath in England is working on the prototype of a three-wheeled vehicle, somewhere between a small city car and a two-wheeler, and only about one metre wide. The vehicle, which looks like a motorcycle but drives like a car, is the result of a project called Clever (Compact Low Emission Vehicle for uRban transport), whose goal is to produce a vehicle that takes up little place and reduces pollution.

ASTRONOMY

A NEW JEWEL IN THE SKY

ARP 220 is one of the three brightest and closest galaxies to the earth. The galaxy, which is the result of two galaxies colliding with one another, is 250 million light-years away from us, and contains enough material to equal 10 million suns.



NASA/ESA

SATELLITE OBSERVATION

BIG BROTHER TO THE RESCUE



BEFORE



AFTER

DigitalGlobe Inc.

Human rights organizations finally got the proof they needed that Robert Mugabe's government forcibly expelled the 10,000 residents of the Porta Farm refugee camp in Zimbabwe in June of 2005, thanks to these

satellite photos. The use of spy technology to further the cause of human rights ought to have been made available to NGOs and other groups years ago, but high costs and delays have prevented it.

ALTRAN PARTNERSHIPS

THE RENAULT F1 TEAM GETS AHEAD OF ITSELF AGAIN

Victory is even sweeter after a long struggle. The Renault F1 Team's results were cause for celebration among its fans, especially for the Altran consultants who helped to make the team's performance what it was. Let's hope that this season ends like the last one: with tears – of joy!

ALTRAN ENERGY

BUTTERFLY EFFECT

These days, everyone knows that electronic devices left on standby consume an excessive amount of energy- in fact, they can account for up to ten percent of a family's yearly electric bill! Countries count the electricity wasted on standby mode in megawatts per year. Altran Tech Design's answer: the Papillon (French for butterfly) power strip. The innovation is part of a general approach to the energy crisis which responds to the demands of sustainable development, the goal being to produce functional, profit-making, and attractive products that are good for the environment.

Each outlet in the power strip has its own switch, meaning that electricity is delivered only to devices on the strip that are actually in use.



B

LEISURE

LEGAL DOWNLOADS GAIN GROUND

The music industry can breathe a collective sigh of relief. With their more complete and easily accessible offer, music companies have finally begun to fend off the threat of pirated music

downloads. In the United states, legal music downloads from paying sites increased much more rapidly this year than illegal swaps of music files, which seem to have stagnated.

ALTRAN INTERNATIONAL
ALTRAN GROWS IN EASTERN EUROPE

The opening of four offices in Eastern and Central Europe has already brought three new contracts for the Altran Group: seeking new suppliers for Siemens VDO in the Czech Republic, improving Magneti Marelli's production plants in Poland, and process optimization and client quality improvement for Le Belier in Hungary.

180 YEARS AGO
PHOTOGRAPHY

In 1826, Joseph Nicéphore Niépce combined three existing processes (the camera obscura, silver salt chemical reactions, and fixing) and produced the first photograph. Since the exposure time required was extremely long, he chose a wing of his home near Chalon-sur-Saône (France) as his first subject. The results of this experiment assured him a place in history, but he died in 1833, before getting a chance to see his invention evolve to the daguerreotype, the negative, flexible film, the advent of colour film, the Polaroid, and, finally, the digital revolution.



B

ALTRAN ASTRONAUTICS

SAFER IN SPACE

CE Consulting, an Italian Altran Group Subsidiary, is part of the European Space Agency (ESA) Eurobot project. Its goal is to reduce risks and problems encountered by astronauts during extra-vehicular activity (EVA) at the International Space Station (ISS). As the project manager for CE Consulting, Massimiliano Cialente handles development for Eurobot's control system, which allows it to move automatically about its environment.



B

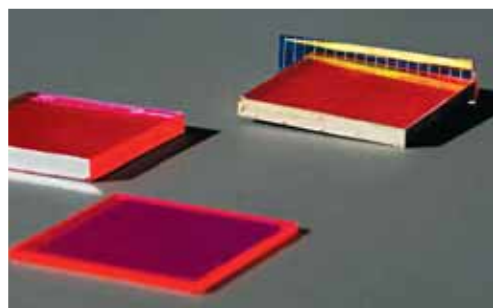
2006 PRIZE: "TECHNOLOGICAL INNOVATION AND ENERGY"

The Altran Foundation awarded its 2006 prize to Rudy Van der Blom's Maxxun project on Thursday June 29th, at Unesco.

The Altran Foundation for Innovation's 2006 prize goes to **Maxxun**, a Dutch start-up which is the brainchild of **Rudy Van der Blom**. The Maxxun project is a groundbreaking solar energy system based on luminescent solar concentrator, or LSC, technology. The system requires less than half of the investment required by existing solar energy systems, and thus significantly reduces the costs of the electricity it produces – a major advantage. The Maxxun project was chosen from the 80 international applicants competing this year. Solar energy systems currently on the market

present a number of drawbacks, including pricey solar cells, a long return on investment, and poor energy production in diffuse light conditions. Rudy Van der Blom's team is experimenting with a luminescent solar concentrator system which uses a sheet of plastic, a fluorescent layer, and a solar cell. The fluorescent layer absorbs and then releases light at the optimal wavelength. A significant amount of this light is then reflected internally into the solar cell. The Maxxun

project's innovative edge is in its reduction of both the solar captor and the solar panel while maintaining the amount of energy it produces, thus considerably reducing the overall cost of the technology.



HONOURABLE MENTION

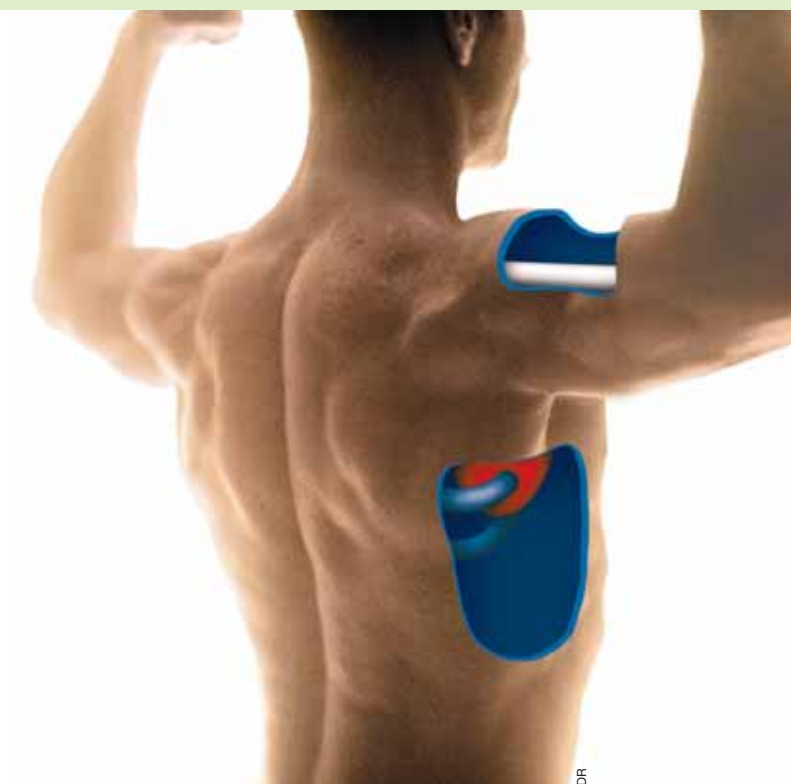


PragmaPAC, a French project lead by **Pierre Forté**, received an honourable mention for the development of new fuel cell technology. This breakaway technology is a radical change in geometry, materials, and assembly that should significantly reduce the cost of hydrogen batteries, and therefore of the energy they produce. "I would like to thank the Foundation for its invaluable help, and for its exemplary prize. To be recognised by our scientific peers is an extraordinary chance which I value immensely."



THREE-YEAR OBJECTIVE

The Altran Foundation for Innovation has made several significant changes to its bylaws for the three coming years, including the establishment of a scientific committee. The role of this think tank, which brings together internal and external participants, will be to define themes, create a methodology for establishing selection criteria, choose jury members, reflect on the evolution of the Foundation, and much more. Christophe Aulnette, chairman of the Altran Foundation for Innovation, sees the Foundation as a vital impetus for Altran's social action, and a major player in the Group's evolution. He has set clear objectives for the three years to come: on the one hand, increase Altran employees' sensitivity to the importance of socially motivated action, and, on the other, raise public awareness of Altran's role as a patron of skill and innovation, thus giving the world's top projects a chance to benefit from Altran's expertise and know-how.



2007 PRIZE: "MENDING THE HUMAN BODY THROUGH TECHNOLOGICAL INNOVATION"

Scientists and doctors today are striving for ever better ways to improve our quality of life and protect our health, seeking new technologies that allow them to "repair" the human body by:

- restoring body function altered at birth or through accident, illness, or simply old age;

- improving diagnostics, detecting and preventing risks;
- perfecting or developing the necessary tools to accomplish these things.

The Foundation's goal is to facilitate the mobility, autonomy, and freedom of the growing number of people affected by such conditions (see page 12).



The Altran Foundation for Innovation marked its tenth birthday on June 29th, at the 2006 Award ceremony. A number of laureates joined the Foundation in celebrating 10 years of encouraging innovation that serves humanity

at the Unesco House. The ceremony was an opportunity to celebrate groundbreaking successes like LAMA mobile laser technology, the Diallertest allergy patch and the automatic cold chain tracing system TraciLOG.

GET INVOLVED!

Starting now, the Foundation is inviting this year's candidates to contact an Altran consultant to help them fine-tune their applications.

- You are an Altran consultant and you'd like to become more involved in the Foundation's activities by sponsoring a project?
- You are leading a project?

Contact **Ludivine Grimmer**
 Tel: +33 (0)1 44 09 54 47 or by email at: fondation@altran.net
www.fondation-altran.org

2007 PRIZE:
OPEN CALL FOR CANDIDATES FROM OCTOBER 1ST, 2006 TO MARCH 27TH, 2007

THE KNOW-IT-ALL OVEN



These days, being a chef is as easy as pie. Programming baking times is child's play with Sauter's USB Oven, introduced at the Foire de Paris. Recipes are downloaded from Sauter's website onto a USB key, which is then plugged into the oven door. The oven manages the details of the baking process automatically. From now on, your soufflés and chocolate brownies will be perfect every time. The oven is expected on the market in 2007. www.sauter-electromenager.com

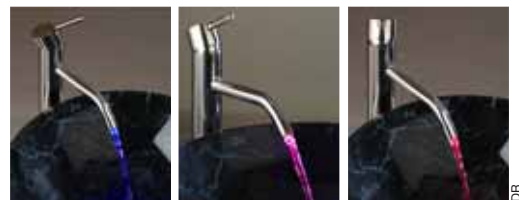


THIS ARMCHAIR WILL GROW ON YOU

Now you can really lounge in the grass! Grow an armchair in your lawn with a cardboard frame, some soil and a handful of seeds. The idea took root at Nucleo, an Italian design firm. About €100. <http://www.nucleo.to/press/terrainindex.htm>

READY-TO-WEAR AIRBAGS

Even two-wheelers get to have airbags! In over half of motorcycle accidents, the driver is thrown off of his or her vehicle, or slides along the roadbed until colliding with a fixed object. A reality, perhaps, but one that no longer needs to be fatal. Helite is introducing a jacket with airbags at the neck, collarbones, back, thighs, and chest. If the driver is separated from the motorcycle, a security cord linking the jacket to the vehicle opens a valve that releases air into the airbags, cushioning the driver in falls and collisions. Helite's jackets and vests have just received CE certification. From €366 to €557 depending on model. <http://airbag.helite.com>



LIGHTS, CAMERA, WATER!

Burning yourself at the tap is a thing of the past with a new generation of intelligent faucets equipped with temperature-sensitive LEDs. Light Delight faucets, the Italian manufacturer Equasystem's latest product line, light up blue when water is cold, red when hot, and violet when warm. About €600. <http://www.equasystem.com>



DR

HIGH-TECH DOSSIER

> THE REPAIRED BODY

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- 14 / REPAIRING THE BODY FROM HEAD TO TOE /
- 17 / FROM THE REPAIRED BODY TO THE IMPROVED BODY...
AN ETHICAL QUANDARY /

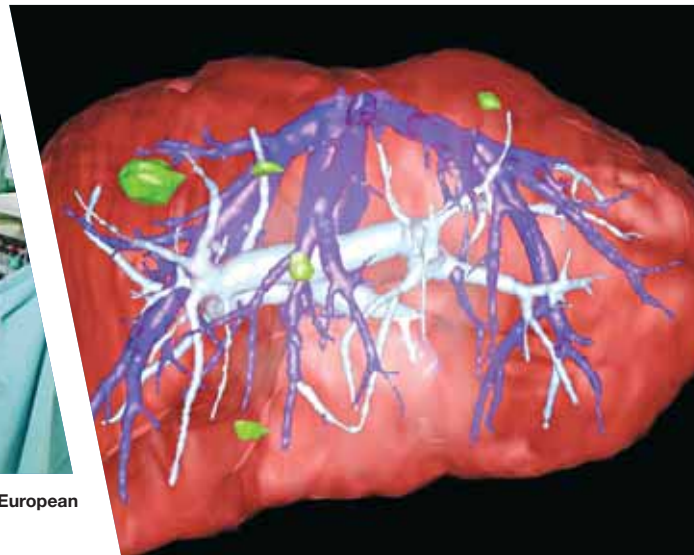
THE REPAIRED BODY

Transplants, implants, prostheses, stimulators, biochips, robotic surgery... Today, medicine relies heavily on biotechnology, nanotechnology, and information technology. So-called "hybrid" patients complement their bodies with machines, while healthcare professionals learn through virtual reality. There's no doubt that the medico-technological revolution is well under way... but how far will it go?



IRCAD/F. Magriot

Every year, 3,200 surgeons are trained in the experimental laboratory at the European Institute of Telesurgery (EITS).



The Institute for Research into Cancer of the Digestive System (IRCAD) is developing software that will use scans and MRI images to reconstruct patients' organs in 3D.

IRCAD

Over the past 15 years, the growth of biotechnology, information technology, and nanotechnology has given rise to a genuine medical and technological revolution. The bionic man – that Hollywood fantasy so prevalent in the 1970s – has now become a reality. Part human, part machine, he is the product of reparative medical procedures that draw from diverse fields such as electronics, physics, robotics, biology, chemistry, and computer science.

The new man

Today, implants and stimulators enable the deaf to hear, the blind to see, and paraplegics to walk. Robotic prosthetic

limbs have become intelligent and autonomous, improving patients' quality of life. Artificial organ transplants (heart, pancreas, etc.) round out stem cell research initiatives by offering a promising solution to the scarcity of donors.

Still, the human body is not always ready to accept these foreign parts, and the risk of rejection persists. To address this problem, researchers are working on both synthetic and natural biomaterials that can interact with tissue. The ceramics (aluminium, zirconia), alloys (chrome-cobalt), and plastics (polyethylene) used in artificial joints now include a bioceramic coating such as hydroxyapatite, a synthetic material with a composition

Robotic prosthetic limbs have become intelligent and autonomous, improving patients' quality of life.



IRCAD/France télécom

In September 2001, using satellite technology that transfers images in a few milliseconds, Dr. Jacques Marescaux, founder of the European Institute of Telesurgery (EITS), performed the world's first transatlantic operation on a patient in Strasbourg while located in New York.

and crystalline structure very close to bone. Developed through computer-assisted design and manufacture techniques, biocompatible prostheses are made to measure and designed to replace injured parts. But the impact of computers on medicine doesn't end there.

Telesurgery and 3D interactive

Thanks to huge strides in 3D interactive, telema-

nipulation, and computer-assisted surgery, minimally invasive surgical procedures such as laparoscopy have already gone virtual. Using images from scans and MRIs, software programs reconstruct patients' organs, bones, skin, and vessels in 3D. This virtual clone of the patient enables surgeons to explore within the body, detect tumours as small as three millimetres, and simulate operations.

continued on page 18 ●●●

ALTRAN FOUNDATION

The repaired body, a fascinating and ambitious theme

Through its 2007 Prize theme, the Altran Foundation for Innovation displays its willingness to deal with the delicate matter of restoring the human functions after birth.

This timely issue opens up many alleys of discussion leading to even more controversial debates. What's the limit for genetic engineering? How can we avoid the man-

machine and superman dangers? Considering the definition of the theme and the mission of the Altran Foundation, some topics are therefore naturally excluded from the 2007 Prize:

- non-reconstructive plastic surgery,
- human cloning,
- doping.

REPAIRING THE BODY FROM HEAD TO TOE

WHEN ELECTRONICS AND ROBOTICS

turn their attention to reparative medicine, the resulting repaired bodies don't seem very far from the proverbial "bionic man." From implants to prostheses to transplants, a brief tour of the high-tech equipment you're likely to see on the surgeon's table today or in the near future.



IN CLINICAL TRIALS

Eyeless vision

Neuro-ophthalmologists are developing eyeglasses for the blind equipped with a special camera. This camera interfaces with a computer linked to an array of platinum stimulation electrodes implanted either in the cerebral cortex or directly onto the optic nerve. When the electrodes are activated, they allow patients to perceive pixellated images, phosphenes (luminous images produced by mechanical stimulation of the retina), and simple geometrical forms in their visual fields. And victims of retinitis pigmentosa will soon be fitted with artificial retinas made of silicon microchips whose thousands of photoreceptors transform light into electrical current.

TODAY



A chip in your ear

Cochlear implants are auditory prostheses that provide a sense of sound to deaf or severely hard-of-hearing patients using an electronic device implanted under the skin and a small external speech processor. The microprocessor picks up and processes sounds, transforming them into electric impulses which are then transmitted by wave to an implanted receiver. The receiver produces an electric signal and sends it to a group of electrodes located in the cochlea, which stimulate the auditory nerve directly.



TODAY, THOUGH NOT GENERALISED

A titanium heart

Made of titanium and polyurethane plastic, the Total Artificial Heart weighs about a kilo and is powered by a silent motor. The heart, which is equipped with two artificial ventricles and their respective valves as well as a hydraulic pumping system, is implanted in the patient's thorax. An internal battery is continuously recharged by electromagnetic waves sent through the skin from an external battery pack worn at the belt. An internal electronic control system implanted in the abdomen monitors and controls the heart, changing pumping speed according to the patient's activities.



COMING SOON

A new pancreas

Type I diabetics will soon be able to control their diabetes (Type I diabetes is the most difficult to stabilize) without the insulin injections they currently use to regulate their blood sugar levels. The artificial pancreas system is equipped with a sensor which measures blood glucose levels in real time. The device is implanted in the vena cava and linked by cable to a subcutaneous insulin pump that dispenses the needed dose of insulin through a catheter floating in the peritoneal cavity. The pump's lithium battery is recharged every three months and has a lifespan of up to 10 years.



COMING SOON

Prostheses linked to the brain

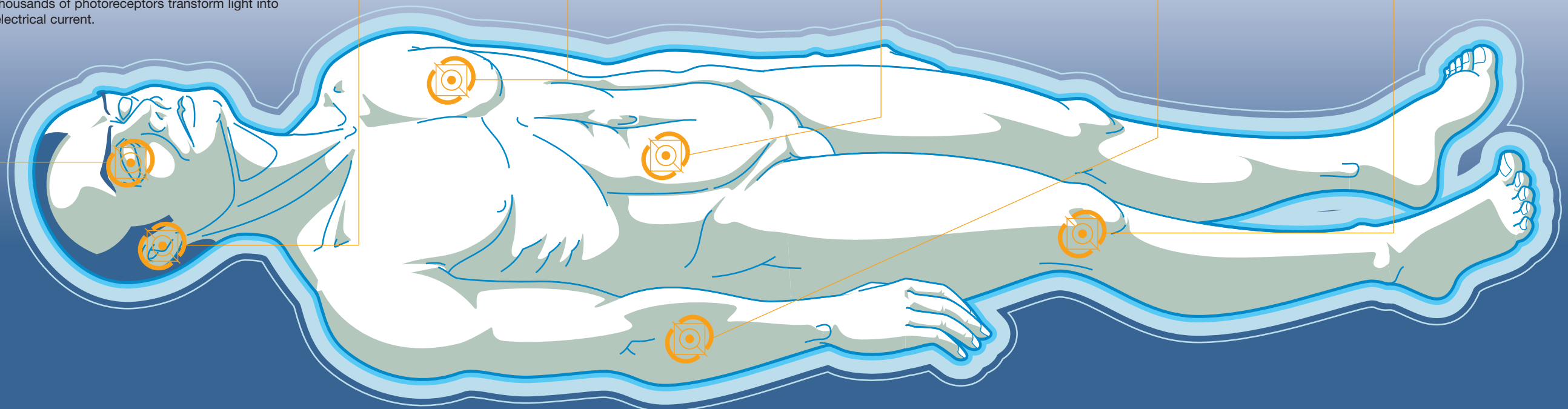
Today, upper limb prostheses are equipped with subcutaneous electrodes which record muscle activity. The information is then transmitted to a microprocessor which activates "intelligent," pressure-sensitive hands capable of discerning the qualities of objects they grasp. Soon, prostheses will attach directly to patients' bones and be thought-controlled using sensors that interpret the signals emitted by the brain to stimulate a muscle.



TODAY

Intelligent knees

The high-tech prosthetic knee is powered by a rechargeable lithium ion battery and uses an electronic chip to calculate the way a patient walks, adapting itself in real time to his or her pace. During the gait cycle, a sensor collects data when the heel strikes and weight is placed on the knee, sending it to a microprocessor that controls a hydraulic valve system. The system regulates the level of assistance given to the wearer depending on the type of gait (ordinary walking, going down steps, etc.). During the swing phase of the cycle, another sensor measures angular speed and calculates the rate at which the leg should swing back.





Intuitive Surgical's Da Vinci S robot features four jointed arms (one camera-based vision system, two operator arms, and one retractor arm). The camera, which can enlarge the images it captures up to 800%, allows surgeons to control the extremities of the robot's three-millimeter instruments, performing highly precise actions.



TINY CHIPS, HIGH HOPES

In 2000, the European project SUAW (Stand Up and Walk) laid the ground for bold forays into restoring the motor functions of paraplegics and tetraplegics. Two patients received electronic implants under the skin of the abdomen, linked to electrodes placed in the nerves and muscles via a network of Teflon-encased steel cables. Activated by radio waves from an external device, the implant stimulates the nervous and muscular systems with electric pulses, reproducing a series of

movements used for walking. Today, a new research team continues trailblazing with the DEMAR (Walking and Artificial Movement) project, which was launched in 2003. With a steady eye to automation and robotics, the team aims to offer viable and miniaturised solutions within five years. "We're trying to develop several independent and autonomous stimulation units, using both wireless technology and nanotechnology," explains project lead David Guiraud¹.

Several microelectronics researchers have already sketched out a system based on implantable silicon chips, which represent a great deal of hope for thousands of paralysed patients.

1. Developed in the Montpellier Computer, Robotics, and Microelectronics Laboratory of Montpellier (Lirmm), the DEMAR project is shared by CNRS, INRIA (the French national Institute for Research in Computer Science and Control), and the Montpellier I and II universities.

INTERVIEW

FROM THE REPAIRED BODY TO THE IMPROVED BODY... AN ETHICAL QUANDARY

Three questions for Joël de Rosnay

The researcher, writer and futurist Joël de Rosnay is science advisor to the president of "La Villette Cité des Sciences et de l'Industrie" as well as the Executive Chairman of the Biotics International company.



Altitude : How should we approach the growth of health-related technologies?

Joël de Rosnay : The major scientific and technological

developments of the last few years have been marked by the convergence of biotechnology, information technology, nano-technology, and microelectronics. This has given rise to new "smart" materials and heralds a medical and technological revolution that promises to repair, modify, and perhaps even transform the body. It opens new horizons that are full of both promise and threats.

Alt. : Will the human body of the future be ethically acceptable?

J. R. : Three distinct phases stand out on the road to the human body

of the future. The first might be called the "repaired body": the restoration of arteries, joints, etc. Here, everyone is in agreement. The "transformed body," on the other hand, already begins to raise flags. Examples include the implantation of cardiac regulators or defibrillators. Finally, the "improved body" implies the acquisition of new functions such as enhanced memory, vision, and hearing. It poses a number of ethical problems because it creates two categories of living beings.

Alt. : Should we be worried about misuse?

J. R. : We must exercise caution with respect to such scientific and technological developments. Theoretically, chips and implants could enhance the cerebral or metabolic functions of a person in good health with the financial means to purchase cutting-edge neuronal, sensory, and metabolic prostheses. We'd run a huge risk of creating a caste system with first- and second-rate humans. An ethical reflection based on our shared values of human rights and liberty for all is in order so we can avoid any abuses that might endanger the future of humankind.

BEST FACES FORWARD

The aesthetic and psychological aspects of reparative medicine are also receiving attention. Facial enhancements known as "passive" prostheses (the nose, ears, eyes, etc.) are adhered, fastened, or attached with magnets to restore the composition of injured patients' faces. Research in this field primarily involves lightweight elastic materials such as silicon as well as customised attachment techniques depending on the patient's skin type and damage.

THE RACE TO BETTER PROSTHESES

Disabled runners are not concerned with fancy electronics or the issue of aesthetics. Their mechanical knees feature connecting rods, hydraulic cylinders, and a carbon-fiber (or fiber glass) leaf seven millimeters thick that replaces the lower part of the leg and ends in a curved surface covered with spikes, which acts as a dynamic foot. In the locker room, athletes discuss energy restitution, leaf flexibility, and distortion under pressure. Over the past 15 years, this technology has helped athletes improve their performance significantly: today, a trans-tibial amputee can run 100 meters in less than 11 seconds!



DPPI

• • • continued from page 13

Coupled with robotics, virtual reality is important for computer-assisted surgery, in which robots fitted with jointed arms execute complex operations at

the command of surgeons who specialise in telemanipulation. In the future, simulations of operations on virtual patients will be saved on computers and sent directly to robots, which will then perform them autonomously.

Nano to the rescue

The development of autonomous systems is a priority in the nanotechnology field as well. From a treatment standpoint, nanostructures are used to ferry active substances straight to the heart of target cells. Combined with iron oxide particles, for example, they use antibodies to adhere to cancerous cells and facilitate selective heat treatment via electromagnetic waves. For dia-

Researchers already anticipate that medical analysis nano-laboratories the size of a credit card will emerge within a decade.

gnostics, researchers already anticipate that, within a decade, clinicians will be using nano-laboratories the size of a credit card for medical analyses. Manufactured according to microprocessor (“lab on a chip”) techniques, these small cards will be capable of drawing nanolitre-scale quantities of blood through microchannels. The blood sample is then analysed by placing the card in a reader equipped with microreactors and separation systems. Inspired by nanotechnology, biochips and neurochips are also part of the therapeutic arsenal of the future. They have already made it possible to use the power of thinking to control computers and to stimulate robotic limbs. Currently intended for the disabled, these technologies could someday enable humans to do things that are currently impossible, opening the door to a number of ethical conundrums we must address.

The “made in Altran” design of recent systems that are both innovative and adapted to new demands is allowing for significant growth in a number of different sectors of production. The women and men who make up our company take a consistently active role in creating our brand’s image. The secret behind our success in this area is our recruitment of extraordinary individuals.

NOTHING BUT BLUE SKIES

> Whether he’s flying fighter jets or developing business ideas and plans, it’s all in a day’s work for Thore von Scheffer, now a business manager for ASKON. A lifelong aeronautics junkie, Thore gets the best of both worlds, as he is the ASKON Key Account Manager for Airbus since March 2006.

Before becoming a business manager for ASKON (a German subsidiary of the Altran Group), Thore von Scheffer was a fighter pilot. Talk about a career change! *“I’ve always had a particular fondness for aeronautics. After studying this field, I decided to spend some time above the clouds as a pilot. Then I looked into other career possibilities, but I wanted to stay close to my passion.”* At an aeronautics convention in Berlin, Thore came across ASKON and seized the opportunity to work for the company. *“Thanks to several trainings at the IMA (Altran Institute of Management), I got my feet wet right away. What I like about my job is the sense of responsibility I feel for*

the projects and my consultants, as well as the opportunity to be creative.”

Thore manages his business unit with the goal of identifying the most promising projects and ensuring their resounding success, whether they involve testing systems or developing them for the A380. *“In this line of work, I most enjoy working with the client and my team, and I really feel like I’m putting my own ideas to the test.”*



THE IRON MAN

> After an unusual educational track, Valentin Soubbotine chose a career with elements of both research and production. He now uses his talents to serve Arcelor’s flat carbon steel metallurgical quality department.

It sounds like nothing special when Valentin Soubbotine describes his studies. *“I started at the Bauman technical university in Moscow, which produced a number of great Russian thinkers. I was then admitted to Polytechnique for a full degree, and I even marched on the Champs-Élysées on 14 July 1999 (french national day)! After that, I matriculated at the École Nationale Supérieure de advanced technologies before completing a postgraduate degree (DEA) in finance.”* Yet he began at the age of 15! Valentin’s academic career left him spoilt for choice, so he focused on his interest in applying mathematics to (almost) contemporary life. *“I’m not interested in research or pure engineering; I fall*

somewhere between the two disciplines.”

It was at one of the Altran Group’s Paris-based subsidiaries that he found projects worthy of his abilities and passion. He now works in Arcelor’s flat carbon steel metallurgical quality department. *“I’ve already completed two important projects. One involved modeling and predicting random blemishes and the other was the development of a general product qualifying system using artificial intelligence. I worked on the prototype with another consultant and four plants are already using it.”* This system’s added bonus is that it enables knowledge sharing among different locations, reflecting the popularization skills of its creator.

Information systems are so prevalent in companies that they can deeply impact their daily operations and growth plans. Through Altran CIS (Consulting and Information Services), which brings together its various subsidiaries in the industry, the Altran Group provides its clients with information systems guidance.

MAKING NETWORKS WORK

After graduating first in her class at the EFREI (French Engineering School of Information Technologies and Management) in 2001, Céline Boulanger has led several consecutive projects for the Natexis Assurances (NA) account since 2004. Her most recent stint as head of the AMOA (contract management assistance) project was her most memorable.

"Natexis products are distributed via the Banques Populaires network, so an NA customer is first a Banque Populaire customer. The NA customer reference system and the banks' are distinct; they talk to each other in a nonreciprocal manner, leaving plenty of room for divergence. The quality of our customer reference system in terms of validity, reliability, and relevance of the content is a major concern for NA, just as it is for every bank, and it is vital to improving customer relations and to studying our customers' behaviour in order to better meet their needs." This project calls for the develop-

ment of a tool in collaboration with all of NA's partners, whose implementation will take a year. A new organisation will be set up along with the creation of the tool in order to implement it, and a two- or three-person department will be established to correct critical anomalies, preventing automatic updates, for example with issues of fiscal residence or CSPs (categories socio-professionnelles, or socio-professional categories). Ensuring data reliability is a crucial first step for one part of the EVASION program, as Emmanuel Troitin explains below.

WORKING WITH NETWORKS

The EVASION program, part of the master information systems plan of Natexis Assurances (NA), has several different components. Axiem consultant Emmanuel Troitin is a project leader for the Electronic Customer File (Dossier Electronique Client, or DEC).

"The DEC interface provides us with a comprehensive, unified perspective that is shared by our customers. This vision, which may be shared with every player involved, reconstructs career information, contact information, documents, and other information." The project comprises three components that will be put in place separately at first and then interfaced: electronic data management, a CRM call center, and an insurance management software package. *"The goal of the project is to integrate all contact data into our electronic data management through a call*

center and to access this data using the software. It will also be possible to view documents stored in the electronic data management system from the DEC interface, and to access and view career information and evolution from within the insurance software." Another bonus: a keen understanding of the customer base that will help the company anticipate market trends through a qualitative and quantitative analysis of customer behaviour, enhance the organisation and internal processes and improve communication among the players involved.

LUC HEURTAUX,
DIRECTOR OF
THE "EVASION"
PROGRAM FOR NATEXIS
ASSURANCES

INTERVIEW

Altitude : From Natexis Assurances's perspective, what is at stake for the EVASION program?

Luc Heurtaux : This program is the logical follow-up to the master information systems plan outlined in 2005. The information systems overhaul program was launched in September 2005. A major project for the next four years, it was designed to meet the needs of our customers and to keep pace with Natexis Assurances's growth.

Alt. : What does this program entail?

L. H. : EVASION is divided into four main categories. First, Emmanuel Troitin will lead the integration of an insurance management software package (Graphtalk AIA) and its component (Graphtalk CRM). Next, the production aspect, which includes electronic data management and ensuring the reliability of client references, is overseen by Céline Boulanger. There is also a distribution section, which includes the creation of a website. Finally, synthesis and steering tools will then cover various subsets, such as accounting.

Alt. : Why did you choose Axiem, an Altran Group subsidiary, to help you with this project?

L. H. : For the past seven or eight years, Axiem and Natexis Assurances have built a long-term relationship based on trust. While consultants have come and gone, their level of skill has remained the same – obviously because most of them stay with us for more than two years. During this time, they acquire new expertise and responsibilities, just like Céline and Emmanuel, who are now leading significant projects.

A holding company that brings together the Banque Populaire Group's insurance subsidiaries, Natexis Assurances offers a complete line of individual and group life insurance, homeowner's insurance, and property damage insurance products. Its diverse and flexible services are designed for individuals, companies, professionals, farmers, and associations. Natexis Assurances uses its expertise and that of its partners to reevaluate its offers on a regular basis and to create effective and competitive products for the Banque Populaire Group's customers.

The Ecole Centrale of Beijing opened its doors in September of 2005. The school is based on the project of the french Ecoles Centrales. Gilles Gleyze, development director of Ecole Centrale Paris tells us more about the most thorough and ambitious project to date in the history of Franco-Chinese cooperation in higher education.

“HELPING OUR BUSINESS PARTNERS IN CHINA”



Altitude: What is your role at Centrale Paris?

Gilles Gleyze : As development director, I am in charge of the school's relationships with companies, continuing education and company-endowed chairs. My job is to facilitate the school's growth with the support of private partners as the State's role weakens.

Alt. : Is the opening of the Ecole Centrale of Beijing a part of this project?

G. G. : Of course. It's one of the biggest aspects of our international strategy. The project is being led by the Ecoles Centrale Intergroup, which brings together Paris, Lyon, Nantes and Lille, and will soon include Marseille. The intergroup has two goals: encouraging

the international reach of the schools and providing training using the "Ecole Centrale" model for Chinese engineers to work with European companies.

Alt. : What's the history behind the project?

G. G. : The project developed very rapidly – less than a year went by between the initial meetings and the first day of school in September 2005. The Chinese came to us seeking inspiration from other models and systems to encourage progress in their own educational system.

Alt. : What form did the partnership ultimately take?

G. G. : It's a joint venture with Beihang University – a kind of pedagogical technology transfer. After students pass their gao kao, the Chinese entrance exams for higher education, the program takes six years. Three of these years are preparatory, focusing mostly on students' language skills. At the request of our local partners, the majority of courses are taught in French.

Alt. : And what is your assessment of this first year?

G. G. : We had to learn to bridge a few cultural differences, satisfy the demands of both French and Chinese public oversight, and find funding (grants, donations, gifts, and other forms of participation), but we are very pleased with the quality of our students, and we are very much looking forward to meeting next year's class.

ALTRAN IS RECRUITING AT THE CITÉ DE LA RÉUSSITE

On October 20th, Altran will hold TechnoCité, an Altran Group recruiting forum for engineers and sales specialists. Altraners from all over the world, representing all aspects of the Group's activities, will be on hand to introduce you to the Group and career opportunities within our companies - whether you've just completed your studies or are an experienced professional.

Go to www.altran.jobs to apply. If accepted, you'll join us at the Sorbonne to take part in a series of conferences on our areas of expertise, among other subjects, or to get a CV "check-up". This event is jointly organised by Altran and the 14th Cité de la Réussite (from 19th to 22nd October 2006 at the Sorbonne), a series of debates on major issues in society today.



ROWING TO SUCCESS

Louis de Besombes followed a classic trajectory – a scientific baccalaureate degree and two years of prep school (advanced mathematics), competitive entrance examinations, and, finally, the Ecole Centrale Paris (ECP). More unusual, perhaps, is that he discovered the ECP through his passion for rowing: the school's rowing team practised at his high school. A few years later, he found himself stroke in the ECP's boat at the Régates en Seine organized by Altran and the Chambre de Commerce et de l'Industrie de Paris (Paris Chamber of Commerce and Industry, or CCIP). "It was a funny competition – for once all we had to do was show up and have fun!" He and his team mates rowed to victory below the Eiffel Tower, and

received quite a prize for their efforts: a weekend at the Grand Prix de France, complete with tickets to an outdoor concert by Pink Floyd. The prize seems tailored to Louis, who, along with a friend, DJs a show on the campus radio station, Radio Pi. "I'm not really a Pink Floyd fan, but the concert was very impressive – colossal, even – as was the Formula 1 race. The speed, the sound, the feeling of competition, and especially all that technology were quite an experience." Perhaps someday his profession will lead him back to the racetracks: he is planning on working "in energy – in engineering or environmental procedures, to be more precise – for a company like Total, Suez, Veolia, or Air Liquide."

HARVARD COURSE: 2007 ALREADY!

The success of "Innovation in Science and Engineering," the 2006 Harvard course organized in cooperation with the Paris Region's Capital Economique Association and in partnership with Altran, is inspiring great enthusiasm for next year's course. Between April and June of 2007, the number of "Grandes Ecoles" students is expected to go up, and planning is underway to expand the course to other European countries where the Altran Group is present.

ALTRAN ENGINEERING ACADEMY AND THE WINNER IS...

On July 31st, Gustav Kristiansson pulled ahead of six other finalists, blazed past the checkered flag, and crossed the finish line to become the winner of the third Altran Engineering Academy (AEA) at Enstone. Of this year's winner, jury president Robin Tuluie says: "As in previous years, candidates and their presentations were extremely impressive, which made our selection tougher than ever. We chose Gustav Kristiansson because he showed us that he had thoroughly considered all aspects of his project, and was able to respond to the jury's arguments with a detailed analysis. This analytic approach, combined



with his straightforward open-mindedness, make him the ideal candidate for work on any number of projects. We are very much looking forward to his arrival at Enstone in September."

THE NUMBERS

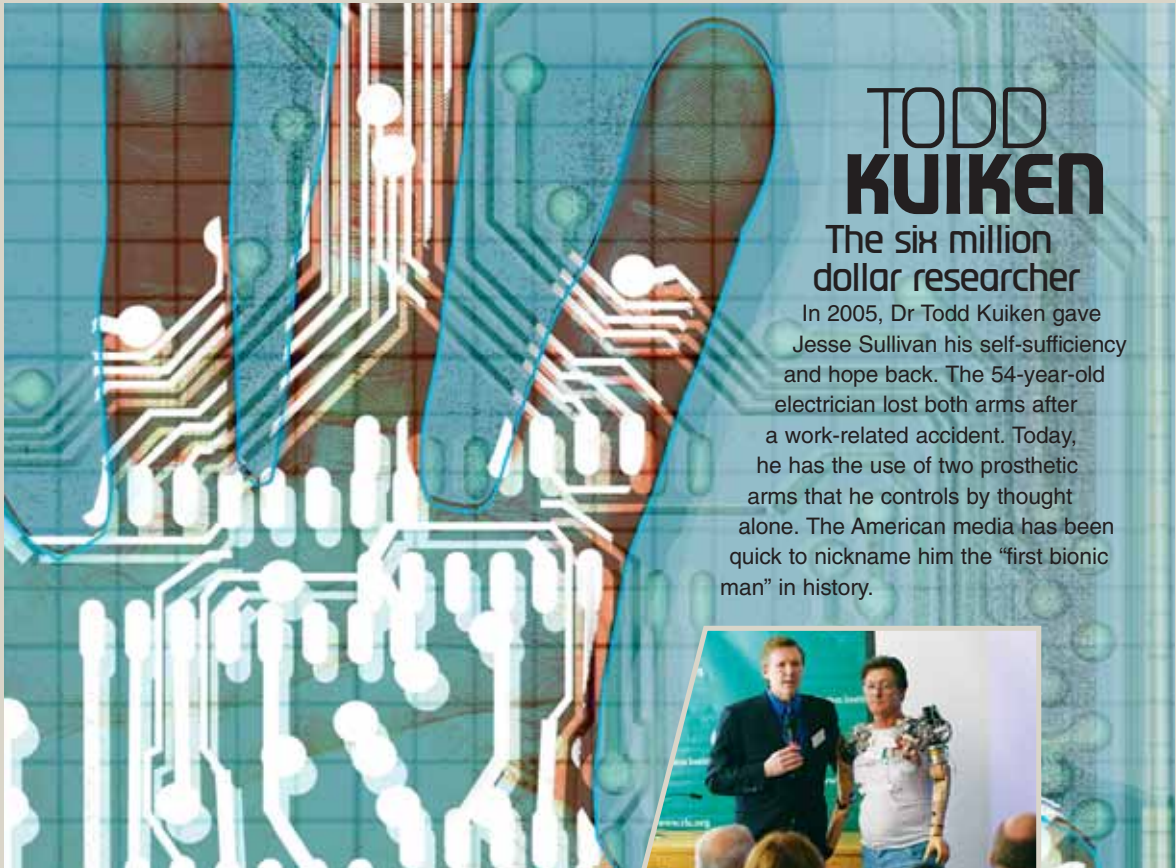
105 students in the class of 2005
125 expected for the class of 2006
300 by the end of the first phase
1 000 student population requested by China in the long term

“BUZZMARKETING” AS A RECRUITING TOOL

Altran Belgium has found an original way to introduce Altran, its philosophy, and the career opportunities it offers to potential job candidates: an entertaining website that uses viral marketing techniques to publicize itself. At www.altranbrainteaser.com, prospective candidates play games in which they solve intellectually challenging problems, analyse complex situations, and come up with creative solutions – just as they would in Altran missions. The cleverest problem solver will receive an iPod nano.

TIMELINE TODD KUIKEN - 1983-1990 : Medical degree from Northwestern University (Illinois) and doctorate in biomedical engineering
1995 : First award for work in the rehabilitation field **2004 :** Director of the Neural Engineering Center for Artificial Limbs, Rehabilitation Institute of Chicago **2005 :** Appointed assistant professor in the biomedical engineering department of Northwestern University.

PORTRAIT



TODD KUIKEN

The six million dollar researcher

In 2005, Dr Todd Kuiken gave Jesse Sullivan his self-sufficiency and hope back. The 54-year-old electrician lost both arms after a work-related accident. Today, he has the use of two prosthetic arms that he controls by thought alone. The American media has been quick to nickname him the “first bionic man” in history.



Photograph extracted from a video

Courtesy of the Rehabilitation Institute of Chicago

“We haven’t yet spent six million, but we certainly hope to!” Dr Todd Kuiken, director of amputee programs at the Rehabilitation Institute of Chicago (RIC), has talked about his work over

the past few months with a touch of humour. But the fact that he operated on the first “bionic man” in history is no joke. After being electrocuted while working on a high-tension line, Jesse Sullivan lost the use of both arms, which were then amputated. Dr Kuiken fitted him with two prosthetic arms that he can move by thinking alone. Viable peripheral nerves were transplanted from the patient’s shoulder onto his pectoral muscle. “Each time you contract a muscle, it emits a weak electric signal,” Dr Kuiken explains. “We can capture this electronic signal and use it via a computer

An electrode translates the myoelectric signals into movements in the “bionic” arm.

implanted within the arm to tell the arm what to do.” The contractions produce myoelectric signals that are detected by an electrode that was specially designed for this patient, which then translates the signals into movements by the “bionic” arm. This huge medical advance was possible thanks to Todd Kuiken’s extensive experience in the rehabilitation field. A doctor specialising in rehabilitation, he has practiced since 1992 at the Rehabilitation Institute of Chicago, where he was named director of the amputee program in 1997. Since 2004, he has overseen the Neural Engineering Center for Artificial Limbs and teaches at Chicago’s Northwestern University. His determination led him to successfully stretch the limits of the human body. Jesse Sullivan can now hug his grandchildren.