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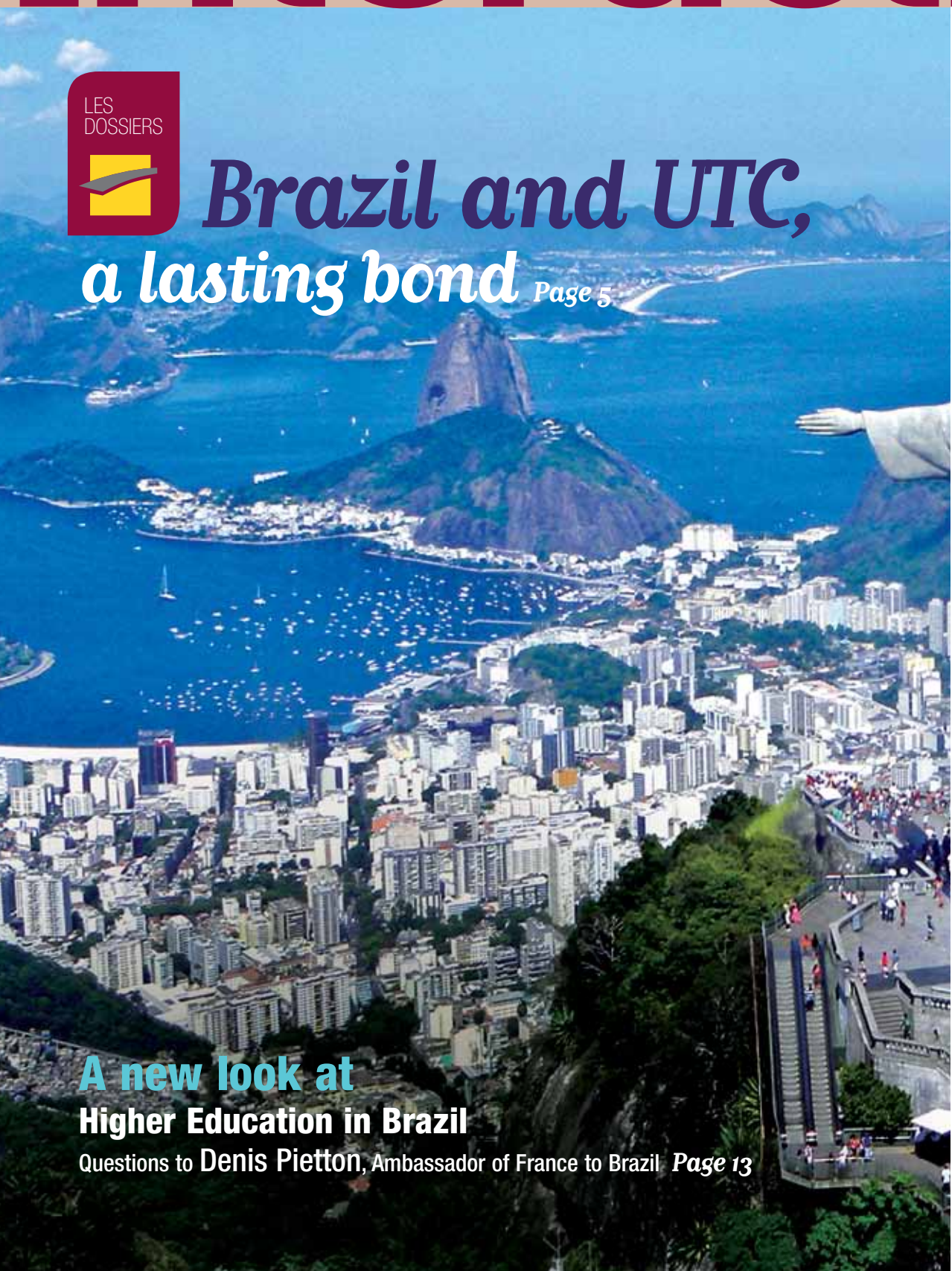
Interactions is available **in French on http://interactions.utc.fr**

Donnons un sens à l'innovation

Interactions



LES DOSSIERS

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FROM THE PRESIDENT'S DESK

World and Territory

This issue of Interactions bolsters my conviction that we now have a real level of coherence in UTC's strategic approach to International Affairs, notably if I look at the example offered by Brazil, our of our main target countries, with whom we set up and today maintain a long and rich tradition of exchange programmes and partnerships (the following pages illustrate this perfectly).
The coherence I see embodies our multi-dimensional characteristics in international policy: we now have an integrated approach to training, to research and innovation, to promotion of partnerships with French business concerns that have assembly sites abroad (e.g., Renault in Brazil), to development of local co-operations in sectors of prime interest to the Picardie Region (e.g., agro-resources).
The strategy here in policy outlook is the same as that used to follow the evolution of UTSeuS in China, with the recent creation of the ComplexCity Laboratory, with the opening in Chile of a UTC offspring establishment opening next month (cf. Interactions #27, to come), with UTC's participation in the University of Industries (Brazil) and indeed with many other projects on drawing boards round the world.
Our long-term ambition is to see these entities interconnected and interacting in networks to form a true Global University of Technology, a creation to which the ongoing digital revolution will be able to offer novel, collaborative ICT tools, assistance to digital pedagogy (MOOCs, e-learning …) and to the promotion of a new race of managers skilled in contributive innovation; the seminar we organized in January 2014 at UTC on the theme "Digital and Creative Innovation" gave us excellent insight as to the impact of the digital world on processes that govern innovation.
Open to the World and firmly anchored in our Territory, this is the new challenge UTC has to face in the next few years! ■

Prof. Alain Storck
President and Vice-Chancellor UTC

Novitact collects Prizes

Startup Novitact won 2nd place in the Cré'ACC "Create with help", competition, a national event to aid create startups via Internet, after selection as a laureate under the category "Innovative creation" in the Picardie Region. Novitact also won the national competition called Graine de Boss 'Boss Seed' that addresses those with a project and companies less than 5 years old. ■

plus d'infos **http://novitact.com**

Signature of a partnership agreement between UTC and Pôle emploi (Government Employment Office)

Tuesday February 18, 2014, UTC President Prof. Alain Storck, and Alain Mauny, Regional Director of the Picardie Region Pole Emploi signed a partnership about employment and development of skills. This occasion offered both parties to formalize and develop the partnership based on "territorial and societal solidarity", as President Storck puts it, presenting the actions undertaken by UTC in the framework of initial training courses and continuous education programmes for the benefit of Picardie Region. Deputy Prefect Hubert Vernet, Government representative for Compiegne-Oise Department also adds that the objective is also to reinforce the links with enterprises as well as with advisors and management in charge of identify possible jobs for the unemployed in Picardie Region. ■

UTC graduate managers in the top 100 French export SMEs

The magazine L'Entreprise has just published its ranking of the top 100 SMEs most visible in international markets. This operation followed suit to an analysis of 6 000 export companies, SMEs with annual turnover between 10 Meuros and 1.5 billion euros. ▶

CHAIRE UTC-CETIM

Mechatronics serving *the cause of innovation*

The Institute of Mechatronics created in 2008 by UTC and the Senlis site of CETIM (Centre technique des industries mécaniques), has recently inaugurated its hydraulic platform. Objectives: to provide in-depth training of engineers in hydraulic sciences and technologies and to develop new industrial partnerships to help innovate in a field that is revolutionizing mechanical engineering as a whole.

"Mechatronics is defined as the specialty that allows new data processing and communications sciences and technologies to be integrated to mechanical engineering", proposes Mohammed Cherfaoui by way of an introduction. M Cherfaoui gained his diploma in mechanical engineering at UTC and is now head of the Mechatronics division at the CETIM. "It is thanks to mechatronics", he adds, "for example, that we have smart self-driving cars today on the road." CETIM who have a regional site at Senlis, in Picardie Region and UTC have been collaboration now for 40 years. In 2008, these establishments set up the Institute of Mechatronics, which has received subsidies close on 6 M euros (40% from the Picardy region, 60% by CETIM, UTC and industrial partners). This was followed by instating a university Chair, in this promising field – first of its kind in France - and the hydraulic platform. "This new piece of complex equipment, developed with the CETIM, and which – in the long term - will integrate UTC's infrastuctures, will bring a strong added value to our engineer training curriculum and will help us develop our industrial partnerships", says Benoit Eynard, research scientist and lecturer at UTC, Director of the Institute. The mechatronics platform is installed in Compiegne, with 3 test rigs that correspond well with UTC's research themes and needs expressed by industrialists.

Energy-related efficiency, noise abatement and training

The first test unit, under the heading "Energy and Models" is devoted to optimizing energy consumption. "Sensors placed in car components, for example in tires, provides accurate reading of pressure. Naturally the sensors themselves must consume a minimum energy themselves," adds Mohammed Cherfaoui to illustrate. The second test rig is called "Vibratory and pulse analysis" relates to reducing noise levels generated by hydraulic transmission lines. The rig was designed in collaboration with Poclain Hydraulics, cf. www.poclain-hydraulics.com/en and was supported financially by the ADEME (French national energy control agency). The third rig is baptized "Pedagogy through practice" and provides a way to approach mechatronics by hands-on teaching situations. "This is very important if we wish to train operations-ready engineers", stresses Benoit Eymard. The platform equipment units (all low powered devices) allow the operators to assess and validate resrecah before moving to high power tests, which are most costly, take more time and use a lot of energy, with the standard CETIM units. "In fact, the platform and standard units at CETIM are complementary", recalls Mohammed Cherfaoui, adding that CTEIM invest some 10 M euros/yr in R&D in the mechatronics field: "France, the only European country to possess a trade union in mechatronics, ARTEMA, is the leader in the field".

High mechatronics recruitment demand

ARTEMA cf. in French, http://www.artema-france.org has 100 members, representing some 28 000 direct jobs, an annual turnover of 5.7 billion euros and 80% of France's mechatronics products and services. The job-scene is this area is buoyant. "Engineers with a mechatronic specialty must be able to master mechanical engineering an electronics, computer science, etc., and secures a job opportunity quite easily", assure Mohammed Cherfaoui. Benoit Eynard confirms: "Only a handful of French universities give training in mechatronics. UTC offers a complete course, open to graduates who qualify in mechanical engineering and mechanical systems engineering". ARTEMA also co-operates with UTC and the CERIM for course design and research: "we sometimes find it difficult to recruit the right profiles!" explains Laurence Chérillat, ARTEMA's Secretary General. "Hydraulic transmission systems are largely unknown territory, whereas the industrialists have clear and important needs to recruit qualified staff in these specialist areas. UTC is a major, indeed unique, partner in France. For this reason, our industrial members support the Institute. The new platform has become a necessity to see the UTC students come to work on the test benches and develop high level R&D".

The platform as a shared facility for industrialists

For Ms Chérillat, the objective of the platform is to offer a work-place conducive to SMEs with innovative mechatronic projects. "The scope for our SMEs is truly world-scale. The platform should enable them to access high level R&D arming them to face strong international competition". Among the numerous companies present for the inaugural ceremonies, Poclain Hydraulics, whose representatives insisted on "the innovative lever that mechatronics can become", says Mohammed Cherfaoui. Locally based agricultural equipment companies (AGCO) are also interested in possibilities. "The platform allows you to consolidate a value chain in the Picardie Region, totally in phase with the local innovation eco-system. The platform was the 'missing link' for is to build new partnerships; the platform also bridges the world of resrecah at UTC and the development of applications conducted by CETIM and the industrial partners", says Benoit Eynard. Laurence Chéraillat recalls also that the platform is open to the entire profession and that its vocation is to gain high national visibility in the field. ■

plus d'infos **webtv.utc.fr** > Nos thématiques > Valorisation & stratégie d'innovation

COMPUTER SCIENCE SECURITY

How safe is safe?

Professor Abdelmadjid Bouabdallah, Head of UTC's Computer Science Department (GI) had a revelation in year 2000: intuitively he thought that with the development of Internet, parallel problems of data and system protection already crucial would take on increasing importance. He decided to invest in this field and the results he and his team have produced now have international recognition.

UTC Heudiasyc's history of security issue research

- An ANR RNRT project in conjunction with EADS-Defence & Security, INRIA, TelecomsParitech and the LAAS laboratory-Toulouse
- An ANR Carnot Project: security issues for sensor networks
- A contract signed with Orange Labs on security for peer-to-peer networks
- A contract signed with Orange Labs on security for system architecture for mobile device transactions
- A CNRS-Heudiasyc project: Security for on-board system

It all began with a thesis on an as yet exploratory subject – management of security access codes in group communications – which when published drew the attention of Motorola. Between year 2002 and the closing down of its Paris region laboratory, the American ICT company liaised frequently with Abdelmadjid Bouabdallah's team members about security issues related to multicast mobile environments. This Heudiasyc Laboratory team is evolving in line with growing computer security questions – the news today regularly exposes new loopholes and new risks. The most recent illustration is the hacking theft of personal data of 800 000 Orange subscribers.

Smart cities, e-health, mobile banking transactions...

"We are currently collaborating with Orange Labs on 'blue sky,' upstream research that addresses security questions in machine-to-machine networks and also the level of trust we can have in new system architectures" says Abdelmadjid Bouabdallah. These new system architectures are those we shall find in tomorrow's smart cities, in mobile banking operations, in communicating objects, in cloud computing, in e-health, etc. "Today, to illustrate the problem, home installed meter readings for electricity and water consumption are detected by micro-sensors that are not at all secure", notes Prof Bouabdallah. "Almost anyone can get this data and modify the figures. We are looking for efficient and reliable solutions to make these sensor network secure and this cannot be done by simply installing anti-virus software". One of the challenges facing the research scientists is the level of consumption needed for the solutions proposed. Secure banking transactions with mobile devices should not be dependent of battery level! One of the ongoing projects, supported by the "excellence" laboratory MS2T deals with questions of object-oriented, with a special focus on access code security. "Research in security is an important building block in axis#1 (communication and interaction) assigned to the MS2T Laboratory", explains Abdelmadjid Bouabdallah.

High international visibility

"The most serious security loopholes relate to system access codes, data protection to prevent it circulating fraudulently, data integrity up and including the identity of the emitter. The relevant solutions will depend on the applications; it is sometime more important to protect the data at source than to try to contain its circulation" explains research scientist Bouabdallah, taking an example from the stock exchange. The solutions are often multidisciplinary: Abdelmadjid Bouabdallah is therefore responsible « system security" which is a, axis transverse in the Heudiasyc organization, covering communications security, operations security and system resilience. There are also adjunct question of confidence: how do you parameter a system enabling you to measure and control the level of (dis)trust that can be placed in the users themselves? An article Prof. Bouabdallah published on these questions in 2008 in Computers & Security was in the Top Ten most cited papers. Thus he thanks 2nd while the late and regretted Hatem Bettahar comes in 10th, in the world tanking of authors in access code literature, as established by Microsoft Academic Search. Abdelmadjid Bouabdallah's team is also cited on the French Embassy in the USA's web-site as an "entry point" for academic research into cyber-attacks and cyber Security.

Responding to needs expressed by business companies

"100% guaranteed security simply does not exist. An example was how the American NAS (National Security Agency) was hacked, with the result that the Agency's homepage became that of a National Stupidity Agency. Hackers often want only to demonstrate their power of interference and potentially cause damage. Business enterprises today have become aware of this and are beginning to hire engineers who are experts in this field." According to the constant company Gartner, the global market for ICT securities software has progressed by some 7.9% and represents a market of 19.2 billion $US for yr. 2012. Over and above the dozen PhD students supervised by Abdelmadjid Bouabdallah, 2 of whom won a prize recently, there are numerous companies that recruit final year student engineers on placement terms, with a promise of career start with the company after graduation. "We now want to work on the creation of a specialist master's degree in the UTC continuous education scheme about ICT and computer science security", concludes Professor Bouabdallah. ■

RESEARCH

Driverless cars

There are some very special vehicles on the road at Renault's Guyancourt Technocentre. They are prototype driverless cars, made accessible to local staff to test a new mobility service that allows them to recover and leave cars at various places in the parking zones. These cars are the result of the PAMU Project, and acronym (in French) for Advanced platform for urban mobility, managed by Renault and where UTC's Heudiasyc Laboratory has played an important role.

Using an on-line interface, Renault Technocentre staff can order a car that will come to collect hem at a given position. Once they get onboard, they take control and drive the car wherever they want, after which the car goes into self-drive mode and returns to its assigned parking place, avoiding obstacles and pedestrians on the way. "The main challenge for us was to equip the cars with so-called "off the shelf", mass-produced sensors proposed by our OEM suppliers, thereby avoiding having to design costly prototype sensors, i.e., different from the Google Car with its highly expensive sensors that are difficult to fit into the vehicle", says Vincent Frémont, lecturer and research scientist at the Heudiasyc Lab. The aim is to get away from the mad-cap project and enter the logical sphere of an industrially viable car. But it must be borne in mind that the components are of black-box design which implies that the scientists cannot access the algorithms nor even the programme lines. "This forces us to consider the level of trust we can place in the data delivered by the devices as yet another parameter", underlines Vincent Frémont.

Capacity to react faced with the unknown

« The prototype that was developed implements a certain number of robotic functionalities that confer a degree of freedom and also the capacity to react when faced with an unknown situation", says Philippe Bonnifait another lecturer research scientist posted with UTC's Heudiasyc Laboratory. Vehicle autonomy depends on using a precise localization and a special map that allows the vehicle to carry out its navigation mission without knowing in advance and with precision the route to take. This is why and how the self-drive car, leaving or returning to its parking berth and recharge connection, can avoid a pedestrian, or to safely overtake a car parked on the road. This is a great advance with respect to other automatic systems that can only follows a perfectly memorized route (via GPS, for example) or follow clear and specific road carriageway markers. Even if numerous tests still remain to be carried out, the PAMU Project has demonstrated the potential of self-drive vehicles using off the shelf components. "In fact", explains Vincent Frémont, "it is the first time that a self-drive project by a French industrialist has produced such results. Today we are studying the follow-up to this work, particularly in relation to improving the rea- time software packages that were prototyped". ■

All the enterprises cited make over 50% of their turnover in export trade. In the ranking, 3 enterprises founded by UTC graduates were present: ESI Group (#27), BI-SAM (#46) and 3JSC 3MUNDI (91#) ■

plus d'infos ▶ **http://lentreprise.lexpress.fr/international-export/classement-120-pme-francaises-championnes-de-l-international-en-2012_34754.html**

Corner stone ceremony for BIOGIS Centre

January 13, 2014, Arnaud Montebourg, minister for Productive Rehabilitation, laid the corner stone of the BIOGIS Centre, Compiegne. This innovation-intense unit will be part of the Institute for Energy Transition, P.I.V.E.R.T. Biogis Centre will serve as a demonstrator for a future oil bearing plant bio-refinery. The objective is to bring together a series of innovative technologies related to plant chemistry. ■

Placement Report Day at UTC

For the first time, Feb.21, 2014, UTC hosted a get-together with all the supervisors of UTC students during the enterprise placements. Some 200 companies had accepted 700 UTYC trainees and at this event hey presented their detailed final reports. Some of the presentations were made at the Innovation Centre, for which the official inauguration should be announced soon. ■

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INNOVATION

An application *to decipher Facebook*

How do Facebook® users use their accounts? Are they aware of what they are doing? The research programme called Algopol [standing for Algorithm Policy] is funded by the French national research assessment agency (ANR) has begun its investigations in this field. Interactions interviewed Guilhem Fouetillou, a UTC graduate, co-founder and Director for Strategy and Innovation with Linkfluence, a partner to the project.

"To access Facebook® data, we created a viral "app" that anyone can download, enabling the user to rebuild the entire history of a Facebook® account and to extract a dynamic, cartographic representation" says Guilhem Fouetillou. The application, developed by Stéphane Raux, a PhD student working with Linkfluence, generates a map that represents the "friends" and the interactions! The comments, the "likes", the messages, the tags, etc. We can observe the user's communities in terms of proximity with the user's account. "What we have is a sort of kinematic scheme of Facebook sociability", summarizes Stéphane.

So, how does information circulate on Facebook®?

TFirst point, all the data we use - and it is only for research purposes – is rendered anonymous. The Algopol partners: Linkfluence, the Centre for Analysis and Social Mathematics [Centre d'analyse et de mathématiques sociales (CAMS, CNRS/EHESS)], Orange Labs France Telecom and the Laboratory for Algorithmic Computer Science, … [Laboratoire d'informatique algorithmique, fondements et applications (LIAFA)] – cannot access the accounts without the users' formal permission. To date we are talking about more than 10 000 volunteers! These volunteers can visualize and parameter their cartography and its evolution over time. "We want to test several hypotheses, notably related to circulation of information between private and private spheres. How, for example, is a public sphere built from interactions between private spheres?" says Guilhem Fouetillou. The volunteers are invited to fill out a questionnaire. This allows the research team to analyze how aware the users are with respect to Facebook® practice. They can also be contacted directly by the research scientist Irène Bastard (doing her doctorate with Orange Labs and Telecom ParisTech so as to take the analyses to more detailed levels of investigation. The project is planned for 3 years, with a budget allocation of 428 000€; Algopol has recently finished gathering the data and is currently starting the phase for data processing. The objective is to create mathematical models capable of simulating, for example, how a piece of information circulates over the Facebook® network.

From user data to client files

Another feature of the project – which carries a more political connotation – demonstrates the absolutely phenomenal quantity of information that Internauts leave on Facebook®, Twitter® and other social networks and which can enable certain operators to build very accurate client files. Most of these services are American. "From a purely academic point of view, as French, it is nigh impossible to have access to anonymous data, contrary ti what we hear about the research teals at the University of Stanford, for example". Hence the need to use an ""app" that can be freely downloaded, allowing them to enter the Facebook sphere. "The imbalance is enormous. The all-powerful situation of the USA raises problems, since research on usage and personal data constitutes one of the bases for economic growth tomorrow and many start-ups will grow in this area", surmises Guilhem Fouetillou. By taking part in this sort of research, Linkfluence is staying to the forefront of competition. ■

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TRAINING

A *MOOC* organized by UT undergraduates

Why is the sky blue? How does an LCD screen work? If you are keen to understand the world around you, then QuidQuam will surely interest you. It is a participative on-line course designed by Unisciel (On-Line Science University, cf. in French http://www.unisciel.fr), accessible via the national platform FUN (France Digital University) and will be run by a team of UT undergrads.

"The aim of Unisciel", explains Manuel Majada, "is to facilitate access to scientific and technical knowledge through a digital pedagogy. To do so, various teaching/training modules and contents have been formatted and circulated, for the purpose of attracting young people to the world of science." Manuel Majada is a research scientist and lecturer at UTC and also Secretary General of Unisciel. The objective first took the shape of a series of short videos to make science matters popular, for students and also for the public at large. "Then we were struck by the growing Mooc phenomenon: the revelation was that there are people out there who want to gain in culture, want to learn more and do so "for fun's sake". We thought this was a marvelous opportunity to circulate scientific culture to the younger audiences and to value-add to the image of our establishments", states Manuel Majada. The next step was to design our Mooc, which we called "QuidQuam? Eureka! Understand the world around you" using Unisciel material as our base, and offering our pedagogical support in order to attract and fidelize a large public. Question - how can we enable learners to interact or collaborate? "Two qualified, bench-mark teachers, Daniel Hennequin, a CNRS research assistant and Maxime Beaugeois, Project leader for Unisciel, will be anchor-men for the course that go on-line every week between Feb.12 and April 27. They will be assisted by a team of students-tutors that we shall train thereby allowing the learners or trainees to explore a given topic further", explains Manuel Majada came from the three UTs. A dozen students were trained in a credit course created specially to meet the needs. Each Mooc course provides for a large degree of freedom to the on-line learners, notably when it comes to delving further into the subject matter: in addition to the video format, there are scientific papers, questionnaire, forums … "But let me be clear, a Mooc will never replace a face-to-face lecture", asserts Manuel Majada, "but it does offer an excellent channel for highly motivate persons to offer their knowledge on-line. This societal aspect is interesting for an establishment such as UTC, and is in lie with our basic credo and values." ■

plus d'infos ▶ **www.france-universite-numerique-mooc.fr**

Brazil and UTC, a lasting bond

In1983, Sergio Asinelli, the first Brazilian student to come to UTC, boarded a plane to France, at a time when it was a rare event to leave one's country. Sergio was a member of the Planning Department secretariat for the region of Curitiba and was selected by the State Department to benefit from a (one out of three) Government bursary in the framework of the programme entitled "Technical management for urban milieus (GTU)" in a partnership with UTC. Ever since, the relationships between UTC and Brazil have continuously grown stronger, in a wide, rich range sectors: agro-resources, computer science and engineering, biomedical engineering, etc. The UTC network now covers all the States in this country 17 times the size of France and there are especially strong ties with 4 universities – PUCPR, UFPR and UTFPR in the state of Paraná and the University of Recife in the State of Pernambuco – as well as withy the Federation of Industries of Parana (FIEPR). With student exchanges leading to awards of double degrees, co-directed PhD theses… the relationships Brazil-UTC can only prosper and develop. Interactions presents an overview of this 30 year exciting adventure.

"Continuous education in Urban Technology Management (UTC-GTU) which was managed by Max Schaegger before being appointed UTC's Director of International Relations was immediately successful. Thanks to the international scope of the course, notably towards Latin America and Africa, there are some 30 students registered every year, coming from round the world, who discover UTC and its expertise in urban issues, sciences and technologies. The lectures and exposes are given mainly by professionals in the water, energy, transport, waste management sectors, etc., plus a placement all of which together made for a very novel training formula", recalls Sergio Asinelli. These graduates then were able to set up the bases of a network that bore fruit in Brazil. To illustrate this: when Sergio returned to his administration in the State of Parana, he was able to send students every year to UTC. In parallel, student exchanges began among PUCPR, UTFPR and UFPR. "Thanks to the selection process of the students and to the quality of training at UTC, various collaborative programmes were set up with the Federation of Industries of Paraná (Cf. article p.7), one of the assigned mission of which is to provide for training of its members", adds Sergio Asinelli, who was Director General for Innovation in the Federation.

The "technological arm" of the Industries of Paraná

Among the collaborative programmes, the programme in industrial computer control is one of the most important. "UTC helped us to organize a training scheme with a dual objective: training of PhDs and professional candidates in industrial computer monitoring. Since that started, UTC has become the technological arm of the Paraná State's industrial sectors. All the experts sent by UTC proved competent not only in their specialty areas but also in the way they developed intercultural relationships with the Brazilians", stresses Sergio Asinelli, singling out Professors Daniel Thomas (cf. article p. 12) and Emile Segard who travelled on several occasions to Brazil to aid the Parana industrialists to valorize the abundance of agro-resources in the region. UTC also participated to bringing together numerous industrialists in France's Picardie Region and the State of Paraná, Brazil. Again ti illustrate: the Solabia group, specialists in biotechnologies and cosmetics, has opened two production units and an R&D Centre in Parana. Today the Picardie Regional and Parana State authorities are working on themes that bring them closer (cf. article p.9)

A dynamic network extending throughout Brazil

PAs time went by, the exchange programmes became denser. Several tens of students and several PhD students cross the Atlantic each year, double degrees have been organized and other are on the drawing board at the moment (cf. article p.11), there is an active network of UTC alumni in Curitiba, capital of the State of Paraná (and where the UTC is most significant). The alumni hold managerial positions in the major industrial groups, either the state enterprises, or Renault (cf. article p.8), or with Siemens. "UTCs reputation extends beyond the frontiers of Paraná", assures Sergio Asinelli. "If we consider the excellent results obtained by FIEPR, the National Confederation of Industries, of which I was Director General, offers training courses and seminars, co-organized with UTC, in each of the 27 States in Brazil. There is at least a 'handful' of trainees in each State who have benefitted from a UTC course", adds Sergio. The example provided by the University of Recife and its biomedical engineering focus is emblematic (cf. article p.10).

From personal contacts and relationships to institutional exchange programmes

There are still numerous challenges ahead if we want to consolidate and develop our relationships between UTC and Brazil. The exchange programmes need to be institutionalized (currently they depend far more on individual persons than on their institutions), to develop research programmes and joint laboratory structures, etc. The now historic links that UTC has established with Brazil add to its legitimacy to forge ahead and consolidate the co-operation. And to give a second wind to this aim, it is always refreshing and rewarding to recall the period when the foundations were laid: "Today, we want to rehabilitate the original UTC-GTU programme and add a sustainable development angle. Negotiations are under way even as I talk to you", says Sergio Asinelli. "The opportunities I see are huge and it is up to us to seize them". ■

LES DOSSIERS INTERACTIONS

ECONOMY

Brazil:

a shortfall in innovation and competitivity

At the time we see Brazil's growth stagnating (GDP rising + 0.9% in 2012 and +2.4% in 2013), the structural weaknesses of the Brazilian economy are become more observable, investments in education are now considered as priorities. Interactions interviewed Benoît Trivulce, Director, UBIfrance Brazil

The basic indicators for Brazil are impressive: a market with 200 M inhabitants 40M of whom have income comparable with European levels, and 85% city dwellers. As Benoît Trivulce underlines "Despite having a territory measuring some 8.5 Mkm² (17 times that of metropolitan France), Brazil's population is concentered in the South and South East, less than 200 km from the coast-line and its beaches. This high urbanization level is an advantage for French companies, who have a high and excellent know-how on the subject ». UTC could, for example, valorize its expertise of its Urban System Engineering department! Another feature of the Brazilian market is its wealth in terms of raw materials, agro- and mining resources and energy sources. "It is this inherent domestic wealth that allows us to predict stable positive growth rates in the mid-term", stresses Benoît Trivulce, but who hastens to add "Brazil today suffers from a lack of investment in its enterprises, and this limits their competitivity and capacity to innovate". Consequently, despite seeing the Brazilian companies offering less expensive products and services, their French competitors could win in the market-place thanks to their level of competitivity and their ability to create new markets.

Biotechnologies, environment, agro-resources, gerontechnology, etc.

In 2013, Ubifrance accompanied 370 enterprises in collective operations and 170 individual ventures (in situ missions and market analyses mainly). France is the 5th direct investor in Brazil, with 600 French companies present (up from the 400 in the middle of the first decade after 2000); they employ over 400 000 staff. "The two most important Brazilian employers, Carrefour and Casino, are French multinationals. The market is one of strategy and not opportunities and which one should not consider coming here for a first export experience. Developing activities here costa a lot, if only in terms of travel expenses", says Benoît Trivulce. In contradistinction, several promising sectors are now opening up: biotechnologies and health, agro-resources and genetic engineering, energy procurement and uses and raw materials in general, urban mobility, the environment (energy savings, prevention of pollution, etc.), industrial processes, new technologies and e-learning (Cf. article p.10), education – a true business – and services provisions related to an ageing population, again a new commercially potential area.

The rule of the "Three Ps"

"Brazil, economically speaking, is doing well. Buy problems of corruption and bureaucracy are still rife; the country needs to undertake fiscal and social reforms", asserts Alain Tissier, executive vice-chairman Renault Brazil (Cf. article p.8), who recalls the time when inflation was running at 100% per month, in the early 1990s. As he sees things, France is not very "visible" in Brazil, despite the presence of several large groups. "We are not as efficient as the Germans, when it comes to self-promotion. And yet, Brazil offers some very attractive opportunities for investors with patience and who prepare their partnerships carefully. Many French companies could identify partnerships here in order to get a foothold in a high potential market slot". The proviso is to follow the rule of the "Three Ps", says Benoît Trivulce, "by which we refer to "procedures, presence and personalization"? Procedures here take time and must be well accompanied. One must be physically present and contact the Brazilians with emotion and even physically and finally, the relationships must be personalized. Brazilians are very 'Latin' and, subsequently, what we have is a country of figure and feeling", says the Director of Ubifrance.

A clear need for qualified engineers

"The Brazilians are also very creative people and they know they must progress in terms of innovation. It is a country where there are more lawyers than qualified engineers, whereas there is a clear need for more qualified engineers", underscores Benoît Trivulce. For example: reflexions are underway in terms of the concept of competitive clusters as implemented in France, of which the governance aspect interests the Brazilians. "We now see Brazilian companies investing in their modernization, but few in the fields for innovation. If a university is looking for partnerships here, it will receive an excellent welcome". ■

Economic data 2013 Main economic indicators

Indicators	Brazil	France
GDP	2 217 Mds USD	2 294 Mds USD
Public debt as % of GDP	35,2%	90,2%
GDP per inhabitant	11 875 USD	35 548 USD
2012 Growth rate (GDP)	0,9%	0,1%
Forecast for GDP 2013	2,5%	0,3%
Forecast for GDP 2014	2%	0,9M
Inflation rate	6,5%	2,5%
Unemployment rate	5,5%	10,2%

Source – French Embassy, Brasilia (economic service), July 2013

INNOVATION

Un réseau de *centres d'innovation*

THE STATE OF PARANÁ

Surface 199 315 km², i.e., 2.34 % total surface of Brazil (8 514 876 km²)

Population approx. 10 M inhabitants, including 300 000 students

State GDP 121 billion $US, viz., 6% Brazil's national GDP

The Brazilian Confederation of Industries, over and above defending the interests of member industrialists, also been assigned the mission to offer training to member manpower resources. The Confederation comprises one Federation per Brazilian State, including therefore the State of Paraná with which UTC has established various forms of co-operation for 30 years now.

Brazil's State of Paraná is highly industrialized. Its manufacturing/assembly sector – 46 000 companies employing 820 000 staff - contributes some 1/3 of the Paraná's GDP. "Our mission", says Filipe Cassapo, chief executive for the Innovation Centre of the Federation of Industries at Curitiba, "is to accompany local industries in their efforts to develop, focusing on better productivity and sustainable development". If innovation is to irrigate the industrial sphere, it must comply with 3 prerequisites: training, consultancy (the culture of innovation, fund-raising, new economic models, technology transfer (TT), and applied research policies.

An Innovation Centre to enhance technology transfer

"In September 2014, we shall be inaugurating an electro-chemical laboratory that will specialize in energy storage issues, waste product treatment, industrial optimization, etc. This lab. will be working in a network format with 23 research establishments connected to the other State Federations throughout Brazil", adds Felipe Cassapo. The Innovation Centre, created in fact 5 years ago in Curitiba near the city's universities, has as its assigned objective to facilitate technology transfers between the academic worlds and industrial applications. "Our industrial companies need to have access to "good practice" in innovation management, concepts which are fairly new to them. The Innovation Centre is the 'bridge' between research and industry. Our network of partners (including UTC) is essential for us to improve our international visibility and ranking", stresses Felipe Cassapo, who, we note, graduated in Computer Science from UTC.

Priority placed on prevention of work accidents

UTC has been working for 30 years with the Federation of Industries of Paraná. Marilia de Souza, who set up contracts with the national Confederation of Industries while she was doing her PhD at UTC in 1996, recalls: "Co-operation projects with UTC fell into one of three main categories: prevention of work accidents with Pierre-Henri Dejean, value analysis through training/action plans, as well as a pedagogical role with training in French for the FIEPR management and simultaneous training solutions, with Bruno Ramond for both the Brazilian and the French students involved." Looking to the future, Marilia de Souza estimates that questions related to prevention of work accidents will remain primordial in Brazilian companies, given the more stringent standards and regulation that now apply. "This is an area of exploration we must get into together, because there is a gap when we consider European standards", she says. Traditionally we are talking about housing and building sectors, agro-food sector mechanical engineering, manufacturing and assembly work, etc.

Sustainable development points the way to new opportunities

Brazil is lacking in quality engineers. There are consequently many opportunities here for French engineers in general and UTC graduates in particular because of our historic partnerships, recognized in the State of Paraná. All sectors in Brazil's economy are making demands, especially in the building trades, mechanical engineering, automobiles, bio-medical engineering, etc. New opportunities and demands are arising through application of the concept of sustainable development, notably in energy procurement and saving, in biotechnologies, in ICT and in the building and public works sectors; environment related challenges are a priority for the FIEPR". Among the perspective openings that would help formalize and strengthen the relationships with UTC, Marilia de Souza underscores the creation of a twinned Franco-Brazilian training establishment, which has been on the drawing board for some time now.

Strengthening the links among the Innovation Centres

Of note is the "Europe" module in the FIEPR MBA entitled "International, strategic Management", co-organized by UTC and the Catholic University of Paraná. In this framework, some 30 entrepreneurs and managers visited the UTC Innovation Centre in 2012 for 10 days and a second group will be arriving end 2014. This Brazilian MBA ranks 88 in the top 100 world-class MBAs: "The Innovation Centres in the State of Paraná and UTC present a real potential for co-operation agreements that really should be valorized, adds Marilia de Souza. Our Innovation Centre is currently investigating 5 research projects in the area of nanotechnologies, related to material resistance. Our electro-chemical laboratory is also participating here, to answer some of the questions and need arising in the petroleum and gas extraction sectors, especially for very deep water drilling, but also for valorization of agro-resources", adds Felipe Cassapo. For UTC research scientists and for the French industries, Brazil is opening the doors for new challenges that lie ahead of a rapidly developing country". Faced with the growing presence of Asian and American business prospectors and actors in Brazil, Felipe Cassapo feels the some very practical projects need to be launched jointly by UT and FIEPR, to serve the industrial and commercial partners of both institutions, blending and balancing long term research and short term projects with rapid industrial results to show. ■

SPREAD

Brazil's only UT, *inspired by UTC*

In 2005, the Universidad de los Artes y Oficios do Parana (Arts & Skills) changed its name by Government decree, becoming the Universidade Tecnologica Federal do Paraná (UTFRP), first University of technology in Brazil. The privileged relationships with UTC were certainly been instrumental in this change.

Up to 2005, there was no university of technology in Brazil. We therefore adapted the French UT model to meet our needs", says Professor Decio Estevao do Nascimento, research scientist at UTFPR. So, why choose the French UTs? Because of the relationships built up between the universities over the decades. And just at the time when UTFPR was on the point of being established, the President of the Brazilian university and Decio Estevao do Nascimento came over to France to have a closer look at what had been considered an UFO on the French HE scene in the 1970s. "The teaching and management staff of the three UTs UTC, UTT and UTBM explained everything, from the training philosophy to the research programmes. Here we had a model we really liked and that we chose to try to duplicate", summarizes Decio. To return the compliment, so to say, Max Schaegger, Bruno Ramond and François Peccoud went to Brazil to provide details about operating UTs in France and to convince the local policy-makers as to the relevance of the French model. Today UTPFR is the largest school of engineers in Brazil, with its 35 courses, its 25 000 student engineers and its presence in 13 cities in the State of Paraná.

Technology transfer, an innovation *per se*

UTPFR is a public sector university. In the current Brazilian system, public universities are less numerous

than their equivalent private institutions, and those that propose an engineering course are few and far between. Consequently, only ¼ of the applicants find a place in public establishments after the equivalent of the Baccalaureate, and these entrants are very carefully screened and selected. “The level of freshmen students is therefore excellent. Compared with standard universities, UTFPR is focusing on technology transfer, over and above the core courses and research assignments”, notes Decio. “Our graduates are much sought after by industrialists, given that they become rapidly operational in their new job. We want, moreover, to pursue this thrust with what we call “3 Is” (Industry, International and Innovation) Engineering course, which we are finalizing with UTC to strengthen the links between students and enterprise”. This 3Is course will crown the student exchange schemes which have continuously expanded since end 1990s, and now registers 120 Brazilian undergraduates/yr., distributed among the 3 French UTs. A double degree has been designed and proposed in Mechanical Engineering. We can note that the flow of students incoming to UTC is higher than those from UTC going to Brazil. “We are, however, trying to remain attractive and to maintain the current numbers. UTFPR is a long way from Brazilian beaches and our stereotypes!” says a smiling Decio. UTC’s Innovation Centre is now a strong attraction for academics and industrialists alike from Paraná, who see this as a valuable, reproducible approach to innovation (Cf. article on FIEPR, p. 7).

UTC is just like Paris!

France, and this includes UTC, has a good reputation seen from Paraná. Renault automobile’s installation and the excellent relationships with UTC and the federal universities surely contributed a lot to these investments. “Renault in fact is involved in the cultural and academic life in Curitiba, more than other car manufacturers located here”, feels Decio. “Renault regularly organizes conferences, seminars in conjunction with the universities and offers a lot of industrial placements to our undergraduates. As far as UTC is concerned, we cannot imagine coming to France and Paris without passing through Compiegne! Today, UTFPR is endeavoring to develop double degrees for all its courses, privileging ten UTs as partners. “We must also enhance and valorize contacts among our laboratories so that we can set up joint research projects” proposes Decio by way of a conclusion. ■

RECRUTEMENT

Engineer profiles
welcomed by industry: Renault

On Renault’s Ayrton Senna site in Curitiba, you often meet engineers who were trained and qualified at UTC. From Marketing to Factor management, these graduates today occupy interesting positions. The cultural experience gained in France, plus UTC training explain, partly this phenomenon.

“Deciding to study abroad is already a token of an open mind”, says Alain Tissier by way of an introduction, Executive Vice Chairman of Renault Brazil. “When Brazilians come to France to study – recalling that Brazil is 17 times larger than France – they often take the opportunity to visit other parts of Europe. When they return to Brazil they do so with a high added value at that critical moment when they are recruited in the job market”. When Renault arrived in Curitiba – with a 250 hectare industrial site – it was concomitant withe the first student exchange programmes. The fact that a French company was setting up shop in their State encouraged a lot of young people to apply to France, even if the attractive alternative, going to the USA was predominant. “At the time, Curitiba was ready to welcome foreign companies. Going to France appeared professionally interesting” recalls Milton Trein, who today is Head of Economic and Strategic Planning at Renault Brazil. In 1998, he was selected by the State University of Paraná to join the second group of Brazilian students who went to UTC – “It was also the year of the World Football Cup” he adds with a beaming smile.

Understanding cultural differences, a major added value

In 1998, it was rather rare for young people to study abroad. Brazil as a country was becoming economically stable, but nonetheless it was difficult to leave. Milton Trein described his year at UTC as very important in order to understand French culture. “For example, in a meeting, the French can get hot under the collar and argue openly with colleagues but this in no way changes their inter-personal relationships, whereas a Brazilian in the same context would play low profile and seek a consensus at any price. This may appear anecdotal but the rules of the game are fundamental if we want to avoid being submitted to hierarchic decision and accepting “soft belly” consensus.” Alain Tissier adds with a smile, that Brazilians still considered” the typical Frenchman as someone who shouts and never washes! If you have the same skills, understanding the other man’s culture is a definite added value. For this reason, those who went to study at UTC and did some placements in the area, now occupy managerial posts with us in Brazil.” While in Compiegne, Milton Trein chose to follow management and economic specialty courses, on top of his basic engineering training in mechanical engineering, before doing a 6 month placement with Faurecia. “This vision of UTC – far more enterprise oriented that what we had in Paraná at the Federal University, contributed a lot to my professional way of life. Learning to speak French also enabled me to follow the discussion when the language in meetings switched to French!” ■

Renault in Brazil

Brazil was Renault’s first industrial installation outside France, indeed outside the EU. In Curitiba, the site assembles private cars and light commercial vans (Logan, Sandero, Duster, Megane II, Master III, with and output capacity of 380 000 vehicles/yr.), as well as engines. Sales have never stopped growing, after a phase of adaptation to the country’s market-place – Renault is the 5th make present in Brazil – a very competitive market. “Renault’s activity since it installed itself here has doubled, thanks to emergence of a new middle class of Brazilian. Brazil is the second country in the world for Renault, in terms of sales, after France. And Brazil contributes to the global growth of the Renault Group, with Russia, India, etc. In Curitiba, the French touch was practically inexistent before Renault arrived on the scene; we now employ 6 500 staff, not including the 25 000 indirect jobs (sub-contracts …) says Alain Tissier. Today the French ‘expats’ have been replaced by Brazilian and South American management. Some of the latter in fact were recruited in France, where their open, positive-thinking and hard-working profile was very much appreciated.

RESEARCH

Consolidating projects in *computer sciences and engineering*

Professor Jean-Paul Barthès (UTC - Computer Science and Engineering) visited Brazil for the first time 20 years ago, in the framework of a European Commission programme, the objective of which was to develop relationships with the Universities and research establishment of Curituba (PUCPR, Tecpar), through "multi-agent" technology transfer and making arrangements to host PhD students. Since that time, Curituba has gained visibility and a high reputation in these fields.

A dozen or so theses have been awarded since, mainly in the area of multi-agent systems designed to improve man-machine interfaces. "Five of my former PhD students created the Computer Science Depart at PUCPR, which now benefits from an excellent national and international visibility, to the point that Curitiba is now an important centre for multi-agent technologies", declares Jean-Paul Barthès proudly. The theses were conducted in a fairly formal framework, with a variety of topics running from train driver operations to analysis of 'feelings' in a remote work group environment. "Between 2010 and 2013, we developed a multi-agent platform at UTC with Tecpar (the Institute of Technology of Paraná), the PUCPR and some Japanese and British partners to the TATIN-PIC project. This platform comprises an assembly of independent, self-standing programmes designed to solve specific problems such as multi-language communication or research project management via an interactive graphic table", explains Jean-Paul Barthès. The technology transfer is now coming to fruition: Tecpar is working currently with Petrobras on AI (artificial intelligence) systems and with the dairy product (milk) sector for the purpose of introducing multi-agent technologies in the division and management processes.

Technology Transfer (TT) from energy to banking

Today Jean-Paul Barthès is supervising the thesis defended by Marcio Suckner. After spending 10 years with HSBC Bank, Brazil, Marcio came to UTC 18 months ago, with his wife, who is also studying for a PhD on the issue of social responsibility of companies based in France and Brazil, in the fields of Technology and Social Sciences under the direction of Prof. Yann Moulier-Boutang. Both of them lecture at PUCPR. "I wish to profit from the expertise UTC has in multi-agent technologies in order to create simpler, more efficient interfaces for clients of computerized banking services that have become more and more complex", says Marcio. In computer science and engineering, Marcio is very grateful for the ease with which he can work in an international context, thanks to the open vision followed by Jean-Paul Barthès, who himself has one misgiving: the relative fragility of bilateral co-operation agreements between France and Brazil that rely more on personal relationships than on any formal agreements. "At a time when Brazil is seeking to develop its international exchange programmes, we really must consolidate the excellent relationships we enjoy today and create a structure which will reflect positively and clearly on our co-operation work and projects". ■

CO-OPERATION FIEP-PARANÀ
STATE/PICARDIE REGION

Brazil, a target for *9 Picard sector specialties*

Picardie Region, since 2010 has been working on enhanced international scope for its SME/SMIs relying for this target on networks of contacts already established by the Region's research and innovation actors. Brazil was quickly identified as a country where efforts should be focused, given the co-operation agreements set up by the IAR and i-Trans clusters, by the Institut LaSalle Beauvais and notably by UTC.

"Our strength lies on the international networks built up by our HE and Research institutions", stresses Karl Tourais, chargé de mission for European and International Affairs at the Regional Council's Directorate for Industry, HE and Research. "Brazil has been identified as one of the interesting network areas, thanks to some 30 years of links established with UTC". Ubifrance carried out a market study for the Picardie Region, defining a development strategy for 9 Picard sectors, with 3 Brazilian States as targets: Paraná, Rio de Janeiro and Sao Paolo. These 9 sectors sub-divide into 2 families of specialty, mature sectors (agro-food, aeronautics, rail transport and mechanical engineering) and future sectors (biomedical, energy storage, green chemistry, smart vehicle, computation and modelling).

A market prospection mission in October 2013

The market study above led to a first prospection in Brazil, October 2013. "We had half a dozen Regional entrepreneurs with us to attend the conferences and workshops organized by Ubifrance during the French Innovation Week in Brazil. Enterprises with relevant know-how, state-of-the-art products or a strong position in a market slot can get into the Brazilian market-place," adds Karl Tourais. As an example there was Exotest (test benches for automobiles), Volevatch (high quality bathroom tap fittings) and Decayeux (mail boxes and safety barriers), who made some interesting prospects. "We must organize physical presence locally to do business. We shall concentrate on the State of Paraná because of these pre-existing networks of contacts", summarizes Karl Tourais, drawing his conclusions about this first mission. The project of a framework agreement between the State of Paraná and the Picardie Region was considered at one point but local election schedules may defer implementing this idea. Picardie authorities also invited the Federation of Industries of Paraná to come to France and discover the Region. "This was a first operation that had its logical place in the context of our formalizing the Region's plan to enhance internationalization of enterprises, in short our acronym 'PRIE', an exercise that was one of the Government demands to help focus our efforts on exportation," concludes Karl Tourais. Picardie Region's PRIE will be based on 7 workshops (governance, export paths, diagnosis and monitoring, sectorial internationalization, academic networks and research serving innovation, attractiveness, manpower and skills), which will be scheduled till June 2014. ■

LES DOSSIERS INTERACTIONS

START-UPS

Digital SK to Crossknowedge-Brazil *the cutting edge of e-learning*

Digital SK, the leading company in e-learning in Brazil was created by a UTC graduate, Romain Mallard, who discovered the country through a university exchange with PUCPR in the State of Paraná.

As an undergraduate matriculated in Mechanical Engineering at UTC, Romain Mallard followed computer science courses at PUCPR in his final year. He was subsequently hired by a UTC graduate to work at Siemens, Brazil, and later did a DEA on distance learning in association between UTC, Siemens and PUCPR. "My business project was inspired by from this research work. It seemed rather natural for me to return to Brazil, both because of the potential for e-learning in the country but also because of the strong network of UTC graduates that would prove more than useful to identify business partners", recalls Romain Mallard. His company Digital SK was launched in 2004, in Curitiba, because of proximity with the aforementioned network.

Innovation and perseverance

Starting from a blank sheet of paper, Digital SK grew and joined forces with the French company Crossknowledge, leader in Europe with a client portfolio of 4M professionals and 400 groups round the world, who in fact acquired Digital SK last year. So, what is the secret of success? "We placed a bet on technological innovation and methodology and chose the right partners. But above all, we lost count of the hours we spent on the job – let's call it sheer perseverance!" says Romain with a smile. The partnership with Crossknowledge allowed Romain to accelerate Digital SK's growth profile, before opening up a catalogue of turn-key high quality training modules. During the adventure, UTC was never far away, even at 5 000 km. Thus the very first Digital SK solutions were in fact created at UTC (using Scenari® technologies) and the partnership with Crossknowledge was monitored by Eric Gebers, a UTC graduate and R&D Director of the company. Out of 50 persons employed in the Crossknowledge-Brazil team, several have a track record that mixes UTC and the Brazilian academic partners, including for example, the Director of Integration!

Growth prospects between 30-35%!

"Our market position, with very high quality products and splendid reactivity proved a good choice for us to bolster our chances in a rapidly expanding market". Digital SK, becoming Crossknowledge-Brazil has clients such as L'Oréal, Arcelor, Petrobras, HSBC, la Fédération des industries du Parana, etc. The home office has been moved to Rio di Janeiro and branch offices have been opened in Brasilia and Sao Paolo. The impressive growth prospects lie between 30% and 35% for year 2014. "The number of students in higher education in Brazil has doubled up thanks to the colossal efforts the country had invested in this area since the 1990s and to national economic growth. A lot still remains to be accomplished and our solutions are positioned on premium quality and very high demand," underscores Romain with enthusiasm. "Brazil is still a complex country where investments when made must adopt a long term vision. Crossknowledge, compared with the competitors, is one of the pioneering companies in the field of e-learning; it is now being consolidated. ■

NEW SECTORS

A unique biomedical training course in Brazil

Biomedical training for engineers was inexistent in Brazil before UTC, in 2001, set up a course at the Federal University of Pernambuco, Recife, North East Brazil, based on a well-proven French model.

"The main original feature of this training course in comparison with the Brazilian model rely on including two 6 month industrial placement periods. The Brazilian ministry in charge of Education at first was circumspect about this novel training scheme, but then came to accept it", says François Canon who participated in the adventure alongside Francis Goubel, François Langevin and Catherine Marcq. The relationship between UTC and the University of Pernambuco goes back to the 1970s when the first group of PhD students came to Compiegne. Then thanks to a four-party agreement between the Confédération nationale des industries, the Federation of Industries of Pernambuco, UTC and the Federal University, a course specifically in biomedical engineering was created in 2001.

Intrinsic quality of biomedical engineers recognized by the medics

"All this was quite relevant: Recife is the 3rd medical pole in Brazil, after Sao Paolo and Belo Horizonte (capital of the State of Minas Gerais). A pharmaceutical pole will soon be located here, as well as technological infrastructure specialized in blood, in a partnership with a French laboratory for fractioning and biotechnologies", adds Professor Silva, in charge of this training course in Recife. "Since 2001, about 100 Brazilian students have followed this 5 year course. As we adapt the contents to market manpower needs, our graduates quickly find job openings in the dozen or so specialist companies that work in medical engineering round the medical pole and in the hospital establishments, where their contribution was in terms of improvements to hospital resource management". Procurement, quality control, maintenance, etc. The early skepticism of the establishments was quickly lifted! "The maturity of our graduates (and hence the course) was recognized by the creating of an independent Department of biomedical engineering in 2013, on the UTC model"; Since 2008, several Brazilian students doing biomedical engineering studies have had the opportunity to spend

a year at UTC in Compiegne in the framework of the bilateral exchange programme “Brafitec”, an acronym combining Brazil, France, Engineer, Technology). They have 6 months in class work and 6 months in placements.

New research projects worth developing

In parallel to training programmes, UTC’s BMBI Laboratory and the food department off UFPE ran a joint research project for 4 years on the consequences of early age de-nutrition on bio muscular functions. All told, some half a dozen theses were awarded under the Capes-Cofecub agreement, established between ‘Coordination of training for HE staff’ on the Brazilian side and the French ministries in charge of Foreign Affairs and Higher Education. “Problems of de-nutrition represent a health challenge in this poor area of Brazil”, recalls Francis Canon. “We transferred our tools to carry out assessment campaigns in the Brazilian hinterland and we found that malnutrition (or de nutrition) when the fetus is developing or in early childhood, can alter definitively the muscular capacity of the person and hence act on his/her metabolism. Thus, and paradoxically, de nutrition can lead to obesity in the adults.”

Promoting a new profession

There were also technology transfers, notably via the local Federation of Brazil’s North East States industries, relating to a tool to asses neuro-muscular functions for de-nutrition cases. “The federation were very interested in technology transfers but today, apart from student exchanges, the partnerships are in need of a new impetus. There are still some important links between our establishments, trough for example publishing of joint scientific papers over and above this specific subject. And there are also opportunities, notably through ‘Science without frontiers’. Brazil has a shortfall of qualified engineers and consequently the Government has been financing, since end 2011, much more training and research programmes in the universities, underscores Francis Canon. Another opportunity of note: creation of a specific biomedical engineering department which opens up new horizons for the training of specialists in the field “I met with François Langevin to discuss about a training course in technical hospital management, something out hospitals needs here” says Ascendino Silva. “We could also enlarge our discussions to bio-mechanical engineering, a sector in which UTC’s expertise is recognized. We may also promote the profession of biomedical engineer, which is as yet not well known in Brazil and we could engage in research activities that would be more technology intensive than academic”. In liaison with the desire to set up double degrees (cf. article p. 11), UTC and the University of Pernabuco are currently studying the feasibility of training in hospital technical management. ■

The Brazilian health sector market

Brazil represents the 7th health market in the world, at nearly 8% of Brazil’s GDP. The offer is unequal when public and private sectors are compared. The single; public health service has over 2 000 health establishments with 145 registered population. The system as such is ‘failing’ and finds it difficult to respond to the needs. The private sector has 4 700 establishments, 58% of which are profit-making. This sector is ‘reserved’ for the most ‘favoured’ (well-heeled) patients and is drawing on the improved income of the Brazilian population at large, caring now for some 50 million patients. These private hospitals are stimulated by the country’s economic growth and the private health service plans and have started to invest. In parallel, the Brazilian Government has decided to prioritise health: investments in this area have been multiplied by a factor of 2.5 over the past 8 years (from 11 to 27 billion). Brazil also represents the 11th world market in terms of medical equipment and comes 7th for global pharmaceutical industries/services.

Source : Ubifrance

MOBILITY

New prospects
to structure France’s links with Brazil

Four double degrees out of a total of fourteen agreed between UTC and foreign universities. This decision was first enacted in 2004 and has grown since, with four new generation double degrees in preparation. Interactions interviewed Olivier Shoefs, Director for International Affairs at UTC.

“UTC currently awards 4 double degrees with Brazilian counterparts, with agreements based on similarities in training courses such that the students would have an added value is registering. In pursuit of UTC’s new policy in international relationships, we shall now begin developing exchanges that will call for complementary course content features”, notes Olivier Shoefs, by way of an introduction.

New generation policy based on complementarities

A student-engineer, in the context of the new generation double degree policy, will be required to choose courses that are not given at his alma mater university. This new approach will enable applicants to choose from a larger palette of specialties. For example, at Itajuba, in the State of Minas Gerais, UTC and the Federal University have already created a new generation double degree in the specialty Renewable Energies open to UTC students in Urban System Engineering (UTC-GSU). “This opportunity brings a new added value to the double degrees per se and enhances their level of attractiveness for the students”, stresses OIivier Shoefs. “For example, mining engineering dos not exist at UTC, whereas this sector is of great interest for certain French industries”.

The double degree: an added value greatly appreciated by the private sector

UTC offers its expertise and even its courses related to valorization of agro-resources, sustainable cities and smart transport, plus the sector of health and associate technologies. The agro-resource theme is of special interest to the State of Paraná, while sustainable cities interests Curitiba and Health engineering Recife. “We are counting on high intrinsic quality in the exchanges: double degrees will correspond to a period of 18 months spent in the host country, 6 of which are in a placement situation, and this greatly enhances the inter-cultural aspects of the stay. For these reasons, we are now going ahead planning 13 new double degrees, the institutional agreements for which will be signed over the next two years”. The added value of such a degree on the market place will be higher than that of a classic semester abroad. “We are training bi-cultural engineers, who will find their first jobs easily and will be appreciated by the companies that hire them”, ensures Olivier Schoefs.

Co-directed PhD studies

UTC is now well known in Brazil, beyond the bilateral agreements. In the framework of "Science without frontiers", a programme launched in 2011 to develop mobility opportunities for Brazilians matriculated for normal and vocational degrees qualifications, Master's degrees , PhDs in pure science, engineering science, the environment and culture-intensive industries, UTC hosted 18 Brazilians out of the 350 beneficiaries of the programme who came over in France. "With no publicity, the demand we received largely exceeded our capacity as potential host! At that time, Brazil had no national PhD courses, and we were able to train about 50 PhDs in UTC. When the PhDs returned to Brazil, many in fact set up their own training course on a model close to that experienced at UTC. Now we enjoy peer-to-peer relationships with Brazil the demand for PhD admissions is decreasing and the new thrust is to have co-directed theses with privileged partners, explains Olivier Schoefs.

Towards a joint research platform?

Here we have an interesting evolution, opening new prospects for international research in the laboratories that could lead to creation of a joint platform for resrecah, along the lines of UTSeuS and ComplexCity in China. "What we aim to do is structure and formalize our presence in Brazil after decades of co-operation that relied in the main on the will and individual commitment of a few actors. The State of Paraná has some very attractive features in terms of our own UTYC specialties – agro-resources, sustainable cities and health related engineering – and could host the joint research platform project." ■

Existing double degrees

Federal University of Paraná
Federal University of Technology, Paraná
Free University of Itajuba
University of Sao Paolo

New generation double degrees

University of Sao Paolo: extension of the existing double diploma to cover Naval Architecture & Construction: joint courses in smart transport systems
Federal University of Rio de Janeiro: joint courses in urban system engineering and management
Federal University of Pernambuco (UFPE): joint courses in ICTs
UTFPR: two new double degrees in Environmental studies and Chemical and Process Engineering

RESEARCH

Agro-resources : cooperation and innovation

"Brazilian agro-industrialists have been thinking about optimising the processes for a long time and are also focussing on innovation in their specialities. The country also disposes of huge land reserves available for sugar crops, without encroaching on the Amazonian forest. The French industrialists, partners of the UTC IAR, are now turning their eyes to Brazil, a country that holds a strategic position," notes Prof Daniel Thomas by way of an introduction. Prof Thomas is also heads research for PIVERT and has travelled to Brazil numerous times to set up joint research projects.

One of the reasons underlying the new interest for Brazil is the possibility this offers to compare sugar-cane processes in a tropical country with those develop in France to transform sugar-beet and miscanthus (commonly known as Elephant Grass). "If we adopt the logic of the PIVERT bio-refinery, consisting of valorising the whole plant, the key value is the biomass production per hectare. Sugar cane, admittedly, produces less sugar per hectare than sugar beet, but the bagasse (pulp of sugar cane after sugar extraction) is valorised in co-generation powers stations, an advantage that allows Brazilian industrialists to be self-sufficient for their energy procurement. This alone increases the competitivity of Brazilian ethanol in the market-place! This simply is impossible using sugar-beet", says Prof. Thomas.

Paraná, Sao Paolo and Alagoas

Numerous interactions have been set up with the relevant industrial Federations, notably in the Brazilian States of Paraná, Sao Paolo and Alagoas, where large quantities of cane sugar grows and with the Federal University of Paraná, where Professor Soccol is the most cited Brazilian research scientists, with his prolific high-level scientific papers. Contacts with UTC are also developing via the company Tereos - one of the inner core partners of IAR (Industry and Agro-Resources cluster)) alongside Roquette, Vivescia, Cristal Union, Soufflet and Sofiprotéol) – who has become the second largest ethanol and sugar producer in Brazil via the subsidiary Guarani, registered don the Stock Exchange. "I had the honour in November 2012 of opening the annual conference on sugar cane in the State of Alagoas, and I shall be returning in March to address another conference about energy transition and agro-resources" adds Daniel Thomas.

The road to 2nd generation bio-fuels

Efforts to produce 2nd generation bio-fuels are attracting lots of interest in both Brazil and Europe. In Europe, the FUTUROL Project (certified by the IAR Cluster) has a budget of 76.4 Meuros. 3 000 km to the West, GraalBio, a biotech company located in the Brazilian State of Alagoas has announced an investment plan of 91 Meuros to build the first 2nd generation bio-fuel plant. "We are in contact and exchanging with them. In Brazil, only the sugar cane leaves are not yet valorised, i.e., some 3-4% of the biomass and that is then part that will be sued to produce the 2nd generation bio-ethanol. In order to gather the leaves rather than burn them in situ, the Brazilians have developed a novel form of agricultural machine and this alone is very interesting in terms of exchange between our respective industrial partners. They have proved very innovative in all the processes that lead from the sugar-cane plantations to the transformation factory", feels Prof. Thomas, recalling that the largest employer in the Picardie Region is AGCO-Massey Fergusson! UTC and its partners are also engaged in forward planning that will lead to assembly of a viable bio-refinery. ■

A new look at Higher Education in Brazil

Denis Pietton, HE the Ambassador of France to Brazil, accepted to answer a short series of questions about Higher Education in Brazil. Before taking up his appointment in Brasília, in 2013, Denis Pietton was Ambassador in South Africa and in the Lebanon, and also Director of the Privy Council of Laurent Fabius (France's Foreign Affairs Minister).

What are the main characteristics of Higher Education in Brazil, often described as in-egalitarian?

Well what I could call a lack of egalitarianism in the HE system here, stems firstly from the cut-off effect between secondary schooling and higher education. On one hand, the best Brazilian lycées register children from the country's middle class. Public primary and secondary schools - free but with pedagogical results of lower repute – take in the less well-of socially, i.e., the lower classes. In higher education, the reverse is true. The best education establishments, 62 federal universities and the major State universities ((São Paulo) are free, but the places are totally taken by the best students from the private sector, while the students from the public secondary sector have to go private establishments and pay their way (fees). There is also a high number of confessional higher education establishments. Moreover, there is no national scheme to help students find lodgings, even if the larger universities have built campus accommodation. For some 15 years now, Brazil has been trying to facilitate access to higher education with bursaries and tutorships to encourage band enhance ethic, cultural and social diversity, including some measures called "positive discrimination" to aid populations with African immigrant ancestry. Another democratic move is under way – traditionally, admission to a university was subject to succeeding in an entrance examination, specific to each establishment, called the 'Vestibular'. Now the federal government is encouraging recognition of results of a higher secondary leaving certificate called the "Enem' that accounted for 7M candidates in 2013.

> We must be prepared at home to welcome Brazilian students who come with demands that differ from what we normally offer in our establishments.

Are the engineering training courses in phase with market needs?

In terms of quality and the palette of themes offered, the answer is "yes". However, the Brazilian HE system only trains about 1/3 of the needed engineers, if we refer to the job market. The positive result, if I may say, is that the graduates are quickly absorbed by the recruiters and have attractive salaries to show. It should be noted that few engineers receive a science-based training so there are proportionately less research scientists who focus on applied scientific research or innovation.

What are the main recruiting sectors for young engineers?

All employment sectors in Brazil need engineers. Priorities here lie in the petroleum product industries and, in more general terms, energy, civil engineering and public works, transportation, ICTs and industry at large.

How do you judge France's position in terms of university exchange programmes with Brazil?

France occupies an excellent position, thanks to its offer of solid programmes and the level of commitment of the actors, notably the institutions, with support from the Government in Brazil and through the ministries. We can be proud of having the oldest university training co-operation with Brazil, going back to the19th century. In 2014, for example, the country's largest university, at São Paulo (USP), will be celebrating its 80th birthday, with the participation of France contributing as it has to the growth of USP ever since it was created thanks to the famous "French University missions" (Deffontaines, Levi-Strauss, Braudel, Bastide, etc.). Closer to modern times, Brazil implemented its first university level co-operation programme, in 1978, Capes-Cofecub that led to awards of over 2 000 PhDs in 800 research programmes – in other words, we are celebrating the 35th anniversary of this co-operation in November 2014. And even closer again, the Brafitec joint engineering courses – UTC being one of the mainstay partners sending students every year to Brazil to complete their training with the aid of the French ministries for Foreign Affairs and for HE and Research. This two-way mobility is a signal as to the quality of the training courses and a good omen for future economic and academic partnerships. This year, France will welcome over 1 000 bursary engineers and will send some 300 students to Brazil, which makes the Brafitec programme the most important mobility programme between the two countries. France is Brazil's first research and mobility partner in Europe. In both university co-operation and technology matters, we are always looking to improve the system continuously, with new arrangements, new programmes that are innovation-intensive (Cifre doctoral degrees) or for better advanced training for future Brazilian mangers through appropriate Master's degrees.

If we consider the development policies that Brazil has been launching in the past few year – do you perceive opportunities for France?

France has some excellent cards to play here, if we can associate the high level of our engineering training to the parallel potential for our economic presence in Brazil's home markets. But first and foremost, we must continue to do what we have been doing well, viz., ventures like Capes-Cofecub or Brafitec: we must build on the co-operation we have in research projects and student training exchanges. Moreover, France's technology-intensive establishments can offer a training framework close to the business world and the bridges that exist must be valorized as best as you can; this is something the Brazilians welcome a lot as it largely increases the level of employability of its graduates. Lastly, backing this work by efforts in research agreements is a guarantee that state-of-the-art science and innovation will be present and possible. Likewise, we must be prepared at home to welcome Brazilian students who come on an individual basis, with demands that differ from what we normally offer in our establishments. In short, we must be prepared to adapt the offer to the demand! ■

DID YOU KNOW THIS?

Brazil's Higher Education system has nearly 6 million matriculated students, 4.5M of whom are in private establishments and 1.5M in the public sector (universities...). Many of these students hold jobs in parallel or follow courses once they have left the initial training programmes. Distant Learning in Brazil is followed by 2.5M students.

PLANT CHEMISTRY

Un équipement *unique au monde*

The inaugural corner stone of the Biogis Centre was laid January 13 in the presence of Arnaud Montebourg, French government minister for productive rehabilitation. The aim of this Centre is to accelerate technology transfer for agro-resource valorization. Plant chemistry is an integral part of the country's ambition to recover industrially. The Biogis Centre will be unique in its category in the world.

Gilles Ravot, Director General, i.e., CEO of the P.I.V.E.R.T. company Ltd (acronym for Picardie Region Plant Innovation – course and technology intensive research) explains that "The Biogis Centre will enable operators to engage in industrial scaled tests for their current research projects". The keys for the main building of the Centre will be handed over in Spring of 2015. The Centre will provide a meeting pony for research scientists and industrialists bringing together pre-competitive research, as in the GENESYS, PIVERT programme and the maturation programmes from the regional industrialists' Club, in a partnership with P.I.V.E.R.T.

36 research projects, first patent claims

Following two calls for projects launched by P.I.V.E.R.T. in 2012 and 2013, 36 research projects were selected. They relate to the entire value chain, from crop growing systems to bio product manufacturing, from molecule cracking to transformation. The first patent claims were registered, notably for new processes that can be used in cosmetology or in bio-plasturgy. "Research projects cover valorization of oil-bearing agro-resources (e.g., colza or sunflowers) and there are no limits to the technology incorporated, nor in the specialty or the areas of application, even if our main thrust is towards plant chemistry and intermediate synthesis stages" details Gilles Ravot. "It is this multi-disciplinarity that is the key driving force behind the Biogis Centre, where the research scientists will have at their disposal biotechnological, thermochemical and formulation labs and workshops, , with standard equipment and some truly innovative tools, from a fermenter to microwave units". The Biogis Centre will be a "modular, evolving technology-intensive hall", where a future bio-refinery will be designed, capable of valorizing the whole plant into renewable chemical products and into energy sources.

A promising ecosystem

« Notre ambition est d'accompagner nos partenaires "Our ambition is to accompany the industrial partners in the ways their supplies change, substituting renewable raw material for fossil resources. There is one sine qua non condition to succeed here: we must devise and develop processes and products that prove cost effective and as efficient as the products being replaced", explains Gilles Ravot. "Plant chemistry is now a global market worth 150 billion euros/year and the forecast is that this figure will rise to 330 billion€ by 2020. Our challenge and aim is to seize the development opportunities and to be in a position to contribute to the creation (at least one quarter) of the 20 000 new job opening expected in this sector in France". The Picardie Region ecosystem back up our ambitions favorably, thanks to the commitment of world class academics (Prof. Daniel Thomas, UTC, is for example, the coordinator of the GENYS programme), of industrialists along the entire value chain (we can cite Limagrain, Veolia, Tereos, Clariant), and abundant agro-resources in the region. "The Biogis Centre marks yet another step towards setting up a new industry", concludes Gilles Ravot, "and this would enable P.I.V.E.R.T. to deploy all its potential which we recall was selected to benefit for the Government support in the Investments for the Future scheme". ■

NATIONAL PRIZE

ACES : *the quality leitmotiv at work*

ACES, located in Senlis, Picardie Region, won the national 2013 Quality-Performance Prize (in the SME category, for applicants with less than 500 on the payroll). ACES now has 22 employees – since Etienne Leblanc, Chairman and CEO took over this company from Henkel in 2007. Since that time, the original ties with UTC have continued to grow stronger.

Etienne Leblanc – who welcomes a UTC student on an industrial operative placement every year - presented his company at the Agora Conference, January 24, 2014. "It is important for the younger generations to hear the point of view of enterprises alongside those from standards certification control agencies such as AFNOR or Veritas. The trainee student moves from post to post in ACES, thereby gaining a global overview of the company. I also proposed taking a group of UTC students for a factory visit – the idea being to generate a desire to come and work with us". Etienne Leblanc simply loves machines, starting his career at LOCTITE where he was offered various managerial appointments. Loctite, as is well known, is specialized in adhesive products for threaded machine parts (bolts, nuts, screw-caps and plugs...) in small and large-scale series – 60 M parts are treated and coated every year! ACES is an acronym in French for Applications, gluing, proofing services); ACES has exclusive trade rights on Loctite products in France and the Benelux. In order to maintain production despite an ongoing crisis in the automobile sector, staring in 2009, Etienne Leblanc diversified his production lines. Initially monopolistic in demand, the automobile sector only now accounts for 20% orders - with similar portions in cosmetics, electronics, aeronautics, etc. The number of clients has risen from 190 to 440, with well-known major brands such as Areva, Zodiac, Ariane Space, etc. So, what is their secret? The company's team is tightly-knit, the working conditions are 'human", hierarchy and organization are flexible and there is a desire that the colleagues be polyvalent, with an omnipresent leitmotiv: quality, quality all the way!

An application file readied with the help of UTC

After his company obtained its ISO 9001 certification in 2009, Etienne Leblanc wanted to take the quality question even further. He submitted his case to the competition organized by the Association France Qualité Performance, with its criteria based on the EFQM (European Foundation for Quality Management) and its high level benchmark standards. With lecturer research scientist Jean-Pierre Caliste (in charge of the Master's degree course on Quality Management), and two students, he examined the 60 page application file, its 9 criteria and 32 sub-criteria. "The EFQM benchmark is more relevant and goes further than then ISO standard", he notes. After a check as to the compliance of the company's answers to corporate reality in the field, ACES was declared laureate for the regional competition, opening the way to compete in the national event with its 58 participants. It's a win-win situation for a Regional SME. "This award crowns the work and commitment of the entire team. The EFQM certification will help us secure business with our clients, given the undisputed proof of quality EFQM offers and it will strengthen and comfort our corporate strategy!" concludes Etienne Leblanc. Next step, to have the dossier translated into English to compete at the European level! ■

STARTUP

Web 3.0 : combining media web-sites and a semantic web

Steny Solitude*graduated with honours from UTC with the specialty Computer Science (GI) and founded Perfect Memory in 2008, a company that proposes a technological break-through and added value process for management of massive data files. He learned, through two early professional experiences, that management of digital contents will become a problem area, diagonally crossing across all markets.

Perfect Memory is a platform used to manage, index and valorise masses of multimedia content (big data files). "We are using the very latest progress in semantic web technologies, to simplify and democratize access to Media Asset Management, which to date has been a closed shop for AV professionals" explains Steny Solitude. "Today everyone produces, shares, indexes and value adds to their AV files. Our work consists of enabling brand names to become media names thanks to this semantic platform. Indeed they could be called media brands". As an example, when Red Bull® put the Felix Baumgartner 39 km sky-dive on line, this brand of energy drinks became an ipso facto TV channel, like many other newcomers to the AV sector. Thanks to Perfect Memory, brands can now economize, no longer having to set up a complex organization to manage, index and annotate their multimedia contents. A semantic platform automatically handles and processes the data and value adds to it from other web sourced data. In this light, Perfect Memory would have enhanced the Red Bull video with Baumgartner's CV, a description of the Earth, the composition of his space-suit and equipment …. "It is a combination of media web-sites and a semantic web, or if you like Web 3.0, thereby increasing the entry points and the level of attractiveness of the contents" summarizes Steny Solitude. The solutions proposed by Perfect Memory can be used in in-house applications to improve communications between veracious services in a large industrial group, for example.

Two UTC PhD students

Steny Solitude has kept strong connections with his alma mater UTC. His company was based for quite a time in Compiegne before moving to Auvergne, where the local ecosystem is more favourable to sectors using and developing new ICT technologies. Perfect Memory already has two emblematic references RTBF (Belgium) and Radio France, several high flying international awards (two IBC prizes in 2013 alone which is an event that had not happened since 30 years back for a French company)! and a fund raising success (some 600 000 € in year 2013. CEO Solitude who has a 15 strong team hopes that 2014 will return excellent commercial results, without losing sight of their "innovation" goal. "As it happens, I learned by heart Bruno Bachimont's thesis about knowledge engineering, an area in which UTC represents a real school of thought", adds Steny. "We have two PhD students working with us at the moment, one on the impact of semantic annotation in archival files and the other on digital story-lines, that in the long term will help us better accompany our clients' desiderata". ■

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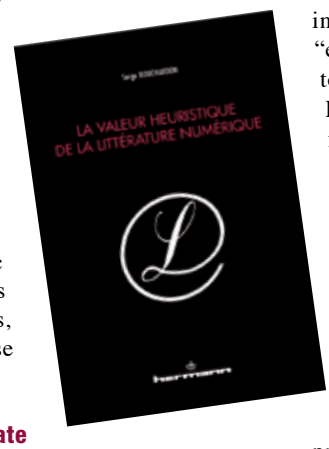
PUBLICATION

When e-books challenge writing

Dr Serge Bouchardon, senior lecturer in ICT sciences at UTC and deputy director of UTC's Costech laboratory has just published « La valeur heuristique de la littérature numérique » [a heuristic value for e-literature] with the Paris editor Hermann. He shares his thoughts with Interactions.

Can you explain how e-literature shows a new heuristic value compared with classic 'paper' production?

Literary creation with and for computers has existed now for over 50 years. We can cite – hypertext fiction, animated poems, pieces incorporating auto-generation text, participative writing … and can readily conclude that digital literature is alive and flourishing, notably in its on-line format. e-literature has become particularly productive, due to an accumulative interest in literature per se, plus communications and pedagogy. This status allows us to rethink and indeed question certain concepts such as authorship, story line, text, material formats... the heuristic value then is seen as that value that enables a retroactive assessment on certain notions, ideas and concepts but is also provides sense and opens new paths for digital writing.



What does this publication add to the debate in e-writing?

We all write on digital supports today and, as examples, we have: e-mails, preparing a slide-show, collegiately writing a text or indulging in synchronous writing via collaborative on-line tools, or writing on a micro-blog... The hypothesis I took for my book held that the very digitals tools and instruments we use transformed writing practice, and it seemed to me that the underlying characteristics required reassessing whenever the supports are digital. Writing on a digital support emphasizes the notions of visual, multimedia and manipulative, modifiable writing. The digital, world is an incentive to discover and rethink writing in all its complexity and, as it happens, "e-literature" provides an excellent topic to help us understand this complexity. For this reason, we included excerpts from existing e-literature that we found in the pedagogical modules designed in the course of a projects funded by the Picardie regional authorities called PRECIP, cf. http://precip.fr.

How do you see the future evolution of e-literature?

Well, it is somewhat presumptuous to answer with confidence a prospective question like that. For the moment, let me say the field is experimental. We could imagine however that e-literature will become diluted in the flow of video games and in net art, or that it will open up paths that have nothing to do with literature, but more to digital creation in its widest connotation. I might add that the producers themselves will continue to propose new interactive literary experiments.

You were one of the guest speakers at the conference on "Decision: processes and dynamics", organized January 16, 2014 by the cluster Sorbonne Universités. In your view, what is the impact of took on decision processes? and on e-literature?

If I may reframe your question as "Do tools allow us to decide matters?, I would say that the question is more acute in that we can observe a growing degree of delegated decision to computer systems, given that the epistemological change accompanying big data processing can add to the apprehension some have that the tools – notably those that incorporate calculations – do the deciding for us. This then allows us to question the technical, phenomenon as a constituent part of human experience and social practice. For example, in e-literature, the technical parts play a crucial role, thus encouraging the actor retrospectively to take technical aspects into account and, likewise, the material framework in the entire e-literary production/ reception chain.

What did the Conference teach us?

I personally was moved by the spirit of the event, in that it sought to identify truly pluridisciplinary, pluristructural research topics. This alone holds promise for the future of Sorbonne Universités. ■

AGENDA
interactions.utc.fr

UTC Open Day
March 15, 2014

UTC will be open Saturday March 15, from 9:30 am to 5:00 pm and will, welcome Bachelors (with or future Baccalaureates) who want to learn more about admission, what UTC courses offers and the possibilities of doing placements or part courses abroad.

d'infos plus ▶ **www.utc.fr**

Industrial Spring in Picardie
March 20 – April 13, 2014

The 9th edition of Industrial Spring in Picardie will take place March 20 – April 13, 2014. The theme chosen for 2014 is "Industry in Europe: how Regions are committed". This year UTC will be organizing a cafe-debate, Tuesday March 25, from 5:00 pm to 8:00 pm I the UTRC Bessel lecture-hall. The theme here will be "Industrial synergy –Europe's Regions and the outsider's view". The debate will be moderated by a journalist from the economic sphere and will be free of access. It will include a video-conference with the State of Paraná, Brazil where UTC has (and maintains) partnerships since it was created (cf. Dossier, Brazil).

d'infos plus ▶ **www.printemps-industrie.picardie.fr**

3rd edition of the National Meeting of Art and Technology
Mars 25-28, 2014

In the framework of the 17th edition of The Festival of Composite Materials, the 3rd edition of the National Meeting of Art and Technology will be held March 25, 2014 at the UVC Innovation Centre, jointly supported by the Espace Jean Legendre and UTC.

d'infos plus ▶ **webtv.utc.fr** > Nos thématiques > Culture, arts & sports

Conference workshop on Catalysis applied to biomass
March 27-28, 2014

The objective of the Workshop, entitled "Catalysis applied to biomass – toward sustainable processes and chemicals", organized by Christophe Len and André Pauss, research scientists and lecturers at UTC, by Georges Santini and Gwenaëlle Hervé from ESCOM and Dorine Cage, representing the Picardie Regional authorities, will be to bring together experts in biomass and catalysis, in order to set up competitive consortia that could then lead on to viable collaborative projects and also to potential applications in bio-refining.

d'infos plus ▶ **http://cabiomass.utc.fr**

SEMINAR

From innovation *waves to o3B*

Following its 40th anniversary conference "Innovating Innovation" in October 2013, UTC organized January 31, 2014, in a partnership with the French confederation of University Vice-Chancellors, a seminar entitled "Digital Innovation and Creativity". Marc Giget, Founder and Director of the European Institute of Creative Strategies and Innovation, delivered the following message:

"Our era, ladies and gentlemen, is witnessing three important evolutions. The first of these relates to the sheer size of the ongoing revolution in ICTs, to which I hasten to add 'intelligence' that is generating a wave of creative destruction [to echo Schumpeter]. What will come next will be, on one hand, a period of radical innovation and we are only at the outset of this change, and on the other, the difficult move from a technology-intensive revolution to a new era of progress. France has always revealed itself as being out of step in terms of hoped for success and progress: all then major case studies of technological success followed by commercial or societal failure are French (Concorde, Super Phénix [experimental fast neutron reactor], etc.!

Competition and complementarity with the human brain

Today almost everything has a digital content, i.e., is controlled by strings of binary digits "O" and "1"? Using digital encoding with other ICT technologies leads to system upheavals that, for the first time, are affecting human intelligence: random, access memories (RAMs), artificial intelligence (AI), research engines, computer aided design (CAD), expert systems, universal machine language, synthetic images, natural language translation, etc. 40, years ago, memory, logic, intelligence, expertise, language, synthesis and translation were exclusive properties of our brains. The recent development and innovation are therefore raising serious questions the foremost of which is: will they one day replace human beings? Or, will these high-level functions become accessible through gigantic tools? The answer, of course, lies somewhere in the middle: taken singly, computation technologies, sorting, selection are proving to be tools deemed of interest but, as is the case of our brain, it is the combination of tools that leads to phenomenal revolutions in complex systems (auto-pilots, command and control system, smart avatars, etc.) that come into competition and are complementary to the brain and natural intelligence.

They know well that holding a dominant market slot only lasts for a few years.

Innovation at the crossroads of science and society

These waves are marked by breakthrough innovations. No candle-maker ever became an incandescent lamp manufacturer. Innovation is the bridge between science and society, between knowledge and individuals, through a dual mechanism of technological 'push' that is driven by the advancement scientific discoveries and the 'pull' or demand of markets driven by societal needs and aspirations. Innovation also goes through creative stages, in new areas for applied research and the arborescence of functions that grow alongside knowledge; and also from studies of needs, behaviours and sensorial analyses of individuals. Without marketing and sociological analysis, there is a high risk of societal failure. Innovation implies integrating the better parts of knowledge in a creative system, given that knowledge is not self-organizing – 50 teams of engineers will draw up 50 standards, so to say! The point of contact defines innovation, the better parts of knowledge to satisfy what society wants most of all. Technology push is constant as can be seen in the field of computer printers: with no less than 9 generations of equipment in only a few decades, since we abandoned electric typewriters, from ink jet printers to 3D printers! Evolution here is almost on a daily basis, to a point that some of us, as we look carefully at ecological impact and functionalities offered, are now raising questions about programmed obsolescence. Each new clear evolution not only represents a risk for the business world - especially those who do play ball and follow the offer – but also provides opportunities and this is where we have creative destruction: Switch replaced Lip, EasyJet replaced SwissAir as Europe's first carrier, Oxylane likewise for Decathlon in sports, Manufrance, etc.

Creative destruction in innovation waves

In contrast with the simplicity of digital language, the amplitude and scale of this innovation wave is far from being under control. It generates a situation that exemplifies perfectly what Joseph Schumpeter called "creative destruction". Destruction precedes creation as can be observed in 14 successive waves since the time of Pericles, 1st Century BC. At what time did the wave create more jobs than it destroys? My job as a lecturer consists of teaching that technical progress does not kill jobs. For example, telephone exchanges in the 1950s used large batteries of female operators. If we had stayed with the jack-connected technology of the day, we would have to hire more than twice the entire French female population to handle today's traffic levels. When the operator exchanges were due to close, people were in the streets protesting to defend the jobs. All operators who lost their jobs did not find further occupation: innovation brings with it some difficult times and changes, during which (re)training become absolutely necessary.

0.2 job openings par i-Phone® application

Today, the digital sector is almost literally exploding, yet modestly. ANR [France's National Research Assessment Agency] invited my Institute to place figures on job creation in the digital world. According to some studies, creation of "digital jobs" (engineers and technicians who master the most recent ICTs) amounts to over 100 000/yr. in Europe and the number of unoccupied job openings continues to grow: from over 200 000 today to maybe 200 000 by 2020. If I can relativize for a second, let me recall that there are 29M unemployed in Europe today. The number of qualified engineers could triple by 2020, which is an unheard of projection, but engineers only represent some 3% max. of

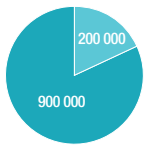
The scientific and technological thrust in the world illustrated by just a few figures.

1M
new research scientists every year half of whom are in China.

22 000
science papers are published every day

2M
patents issued per year 1M in 2008

the population. There must be something like 800 000 "apps", as I talk to you, but each "app" only generates 0.2 opening, i.e., you need 5 apps to create one job opening! Conclusion, you need to launch 5 'apps' to create one job opening. The first application in terms of job creation, Angry Birds, accounts for 640 jobs. But its contribution to the evolution of Mankind is not self-evident at first sight. … The 'apps' market in Europe (EU28) represents 794 000 employment positions in 2013. But there is no analysis of the (im)balance between job creation and destruction, for instance jobs created at Amazon vs jobs lost by book-stores. It is advisable to think a bit and thereby avoid a clash in the gathering maelstrom. If we look at Motorola, plus Nokia, Blackberry, Apple and Samsung (then latter alone having 2/3 the total mobile phone market sales), we can see that the current growth rate is not always a pleasurable event for these 'majors'. They know well that holding a dominant market slot with a new generation of equipment or service only lasts for a few years (5 to 7 on average).Nortel Networks represented a Canadian stock exchange valuation of 49 billion $CA and yet was sold out for 25 M$, thus marking the sad end of a world leader in the field. Their successor Blackberry on the podium has today lost 95% of its value. Creative destruction is a phenomenon that can be extraordinarily violent. Destruction does not necessarily lead to creation. When France changed over from 2G to 3G [second to third generation mobile GSM], it lost a series of computer manufacturers and telephone operators (Matra, Sagem, Alcatel, Bull, Thomson, Goupil), even if some of them put up a fight to the finish, the final outcome was a loss of 245 000 jobs. New market incomers arrived on the scene: Parrot, Withings, Skyboard and others but they are all small players when it comes to job creation. The problem of leaders staying in the trace is every bit as important as survival for start-ups and raises the issue of how their staff are trained.



Forecast of creation of "digital jobs" of unoccupied job openings

engineers and technicians who master the most recent ICTs

- Today
- 2020

"Going digital kills your jobs"

Society today is faced with the effects of first generation digital systems and we tend to lose our marks. Paru Vendu closed and that was 1 650 jobs, compared with 372 for Le Bon Coin. In the United States, who are ahead of the world, everyone is asking: when will the creation/destruction plots recross? Even the best, most optimistic techno-nerds at MIT and Stanford are raising this question because the evolution of the market place simply does not fit their expectations. In the USA, the active population is subdivided into 3 segments: 1° those who earn more than 68 000$US/yr. (engineers, managers, etc.), 2° the middle class (between 38 000 and 68 000$US and 3° the underpaid or badly paid. New employment openings that relate to the digital revolution are reserved for the N°1 category, viz., the riches, which could well double up or triple in size in coming years in certain countries and even more so the category of least well paid jobs. The average salary at Apple is lower than the national average for the USA as a whole. Out of 110 000 jobs at Amazon, 90 000 are paid less than their counterparts employed in the large-scale retail distribution sector. Intelligence-related technologies are now replacing skill-based expertise, analytic, reflection-related technologies as well a lot of middle class professions. So, what should training consist of? Should we (can we) train for jobs that do not as yet exist? Society at large is far more concerned here than the digital professionals themselves. In the United States, it is not uncommon now to read billboards with "Digital kills your jobs" and we shall no doubt see this on our side of the Atlantic in 5 years from now if no solution to the employment is not found.

From rationalization to creation

Depending on the models we construct of the innovation waves, we must firstly go through a period where knowledge accumulates (a period in which a lot is said in terms of R&D), then comes then technological revolution (during which phase the word innovation predominates), then comes the creative synthesis during which the term Progress is the determining factor. This synthesis phase, exemplified by the financial crisis (-20-25% drop in GNP) and new hallmarks such as Google, et al., rocks Society violently, a society who only aspires to improved wellbeing. Nobody in their right mind can fall in love with a WiFi access protocol! The impact of new technologies generally takes place in two shifts: the first is in a direct application, such as the USB key which led to a series of new technological "bricks", far cheaper to make and use than previous connectors and devices. That wave is rationalized, low cost and even hard discount. The second move is when radical innovations that replace entire systems are introduced. This is the creative phase that leads to new jobs just as happens when automobiles became an ad-mass industry.

Innovation also goes through creative stages, in new areas for applied research and the arborescence of functions that grow alongside knowledge

Innovators transform concepts into MHz of happiness

The big challenge today lies in what new technologies bring for human beings as a whole, and how they affect individuals in society. New and fascinating products are emerging, such as Ipseo (Essilor) and its inbuilt system to adapt to every individual's eye-sight, or the possibility to learn a foreign language without being aware of what is happening (Cyber teachers) or the automat translator by Samsung after 37 years of R&D; then we have non-invasive surgery, exo-skeletons and the artificial heart [Carmat developed, implanted [and running after 60 days] in a human after 28 years of R&D [by Prof. A. Carpentier et al.]. In France the Saclay science site saw the construction of the first genetic medicine plant, May 2013. The first injection of a genetic engineering product cost 325 000$USD, but it marks the very beginning of a long history. Second, similar factory will open in China in 5 years' time. Creative syntheses rely on an accumulation of a large number of innovations. 03B, acronym for 'the other 3 billion', i.e., those who have neither telephone, nor access to Internet has brought together Google, Ariane Espace, HSBC, with the objective to have these services offered to anyone for 50 cents/yr. The cost of the system is estimated at 2.5 billion $US. New products and services are in line here with a true technological revolution. But the move to join this revolution and move on to a new era of progress is difficult and France is lagging behind at the moment. In the 19th Century France imposed the concept of Progress. What is innovation if not transforming any concept into MHz of happiness, i.e., improving everyone's well-being and creating added value thanks to knowledge and its implementations. Failing to do this, as Max Weber wrote back in 1913, would lead to "Technology disenchanting the world".

The 'apps' market in Europe
represents **794 000** **employment positions in 2013**

Today's users are disappointed

The scientific and technological thrust can be illustrated by just a few figures. There are about 1 M new research scientists every year in the world, half of whom are in China. 22 000 science papers are published every day, the numbers of patents issued per year has risen from 1 to 2 M in the past 5 years, but at the same time, 1/3 of the 8/5 million active patents in fact become worthless in the financial quarter after they are registered at the patent office. All the figures I give here will double up in the coming decade, mainly through the impact of the merging countries. The main problem is the gap between advancement of scientific knowledge and the moment and way it is delivered to Society. Two thirds of all innovation are rejected by the market place in a lapse of time of 3 months. Knowing exactly what people want is probably the most sensitive question. The renaissance period had already defined 4 objectives attributed to modern innovation. Improving human lifestyles, idem our interpersonal relationships, idem urban life conditions and finally our relationship with Nature. This is constitutive of a humanistic approach to innovation, accepted by all, and which is today's main challenge. For Steve Jobs, going from technologies to applications will be a waste of time. You have to identify deep-rooted needs to bring technologies to serve that purpose. The key call comes from then user and today the users are disappointed. Philips carries out a wide-ranging annual survey of customer satisfaction with respect to new products. There results have never been so bad: people simply feel that technological gadgets to nothing to alleviate traffic jams, improve their health or help the unemployed to get a job.

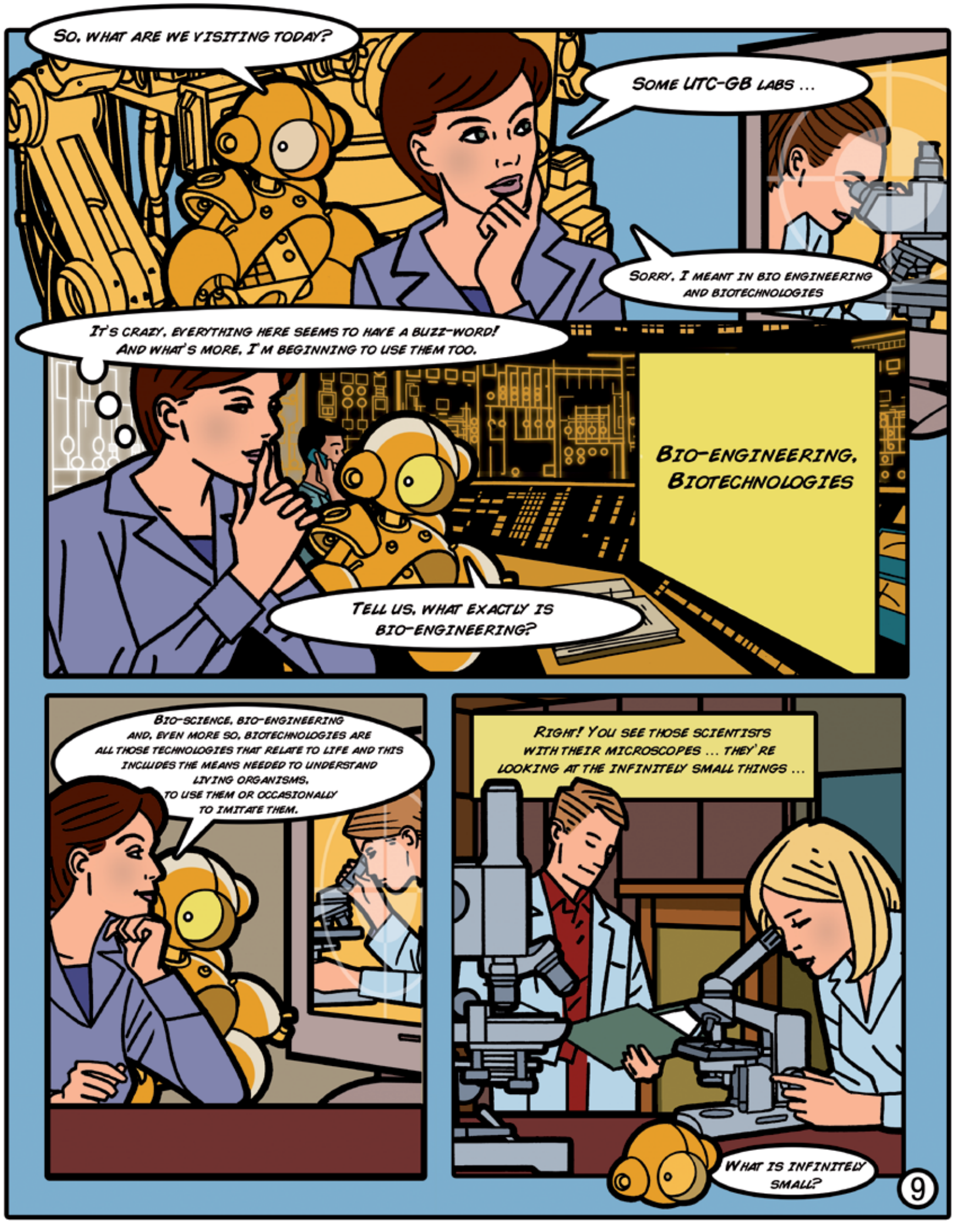
So, now let's talk about the concept of Progress

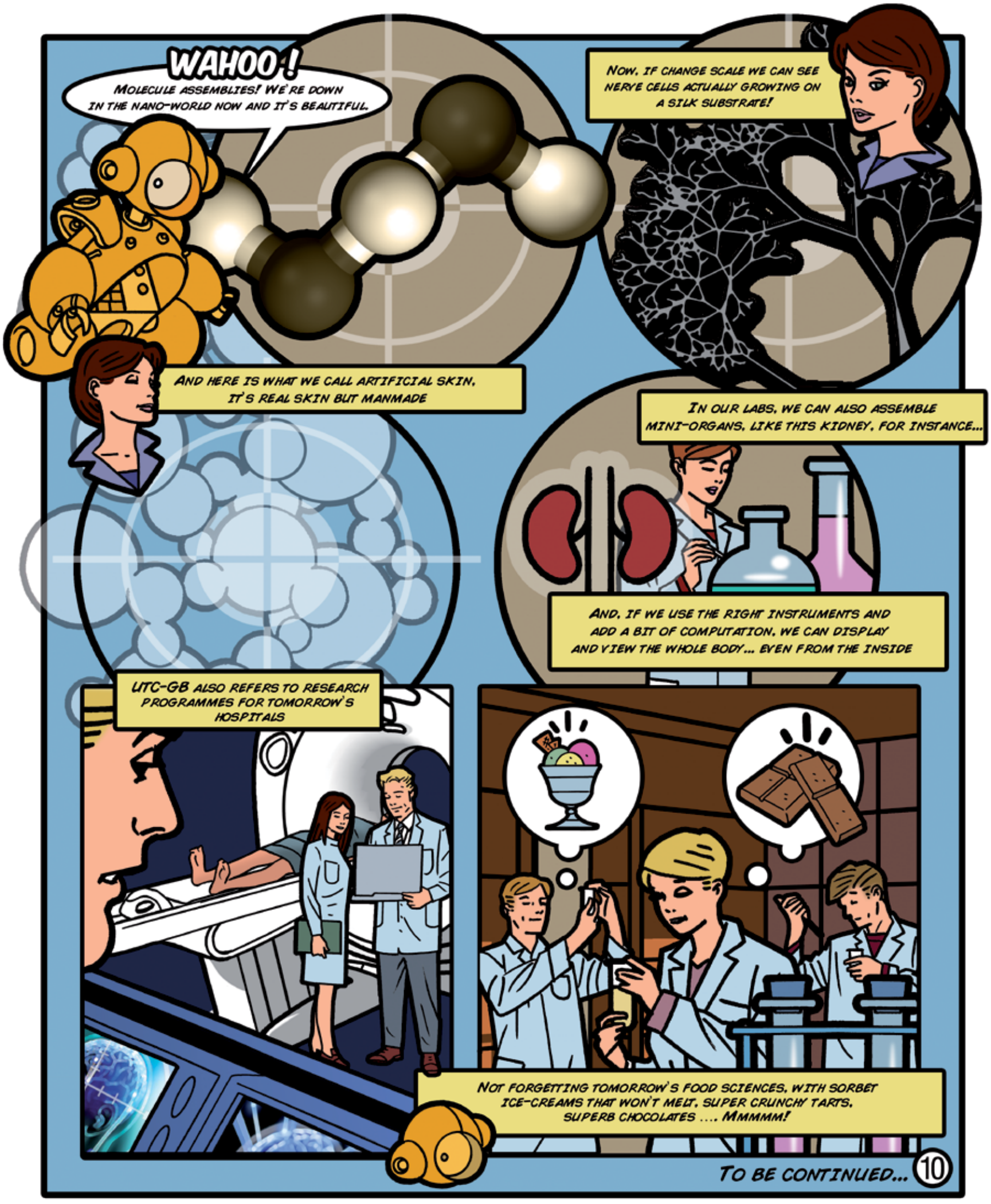
The trend for Google requests for the following 4 terms: Progress, Technology, Innovation and R&D, is clear: R&D, technology and Innovation are losing ground, while the concept of Progress has been growing ever since 2005. People want to discuss Progress. Half of the failures France has had in 'high-tech' ventures relate to marketing problems, compared with one third due to wrong technological choices. We should be making the products our people want, idem for the emerging countries and this apparently constitutes a major problem! The place where innovation is expected lie in real life places, like school, sports stadiums, offices, retirement homes, hospitals, social security services, the employment bureaus, courts and tribunals, transport, housing, etc. This process is called Design thinking and calls for observation of real life situations and analysis of ways to improve them. The fact that users are now becoming integrated to the product and service design circuit is another major trend that must be taken into account.

Is there an "Innovation gap"?

Brazil is the most web-connected country in the world. In France, we spend 4h a day on the Internet (January 2014) compared with 5h in the USA and 6 in Brazil. Brazilians "uses" five times more social networking than we do in France. And yet, everybody is out in the street demanding better education, better health, better transport, etc. As I talk to you, Silicon Valley is being keel-hauled in the USA, accused off indulging in a "digital whenever, forever" thrust whereas it must be seen that employment opportunities are created by the major groups and not by the Californian (and other) start-ups. In the USA who are some 10 years ahead of us, the theory of an "innovation gap" is growing apace. This theory holds that if we analyze previous creative destruction waves, today's wave is not creating more employment in the new sectors than the previous waves. Visiting Silicon Valley in January, President Barack Obama brought together 600 CEOs of America's best start-ups, inviting them jointly to identify the paths to be followed to get the economy on an upturn move again. Google's CEO [Larry Page] asserted that tomorrow's jobs will be in education, health and transport sectors. Today, 45% of Google's R&D is focused on health, i.e., moving distinctly away from their earlier web targets and calling. There is a huge need for education and training, notably for young people, in order to understand technology and to learn how to use them to foster Mankind's progress. ■

On its 40th anniversary, UTC rewrites its history, in comic strip style : **In the heart of the Future**




WAHOO!
Molecule assemblies! We're down in the nano-world now and it's beautiful.
Now, if change scale we can see nerve cells actually growing on a silk substrate!
And here is what we call artificial skin, it's real skin but manmade
In our labs, we can also assemble mini-organs, like this kidney, for instance...
And, if we use the right instruments and add a bit of computation, we can display and view the whole body... even from the inside
UTC-GB also refers to research programmes for tomorrow's hospitals
Not forgetting tomorrow's food sciences, with sorbet ice-creams that won't melt, super crunchy tarts, superb chocolates .... Mmmmm!
To be continued...
10

"Yours faithfully, passionately"

Joseph Bravo joined Chanel in 1989, and today he is Executive Operations Director (Fine Leatherwear, Fantasy jewelry and textile accessories). This UTC graduate (Biological Engineering) has moved from fashion shows to slaughter-houses, from 3-year strategic plans to high class back pack details.

"The world of fashion is organized round 6 collections each year", says Joseph Bravo, by way of an introduction, who now manages a team of 60. 60% of whom are qualified engineers – "with one from UTC and one from UTBM (Belfort-Montbéliard); I recruited both personally! So what exactly is his job? It consists of accompanying the style studio, seeking to secure an environment conduce to creativity, to supervise fabrication, to assure logistics of the products from assembly bench to the shop counter … and all of this with very short lead-times.

Learning to forget one is an engineer!

"We're in a logic of perishable goods" adds Joseph Bravo who has a great admiration (and justly so) for the products and their novelty. "The studio is always pushing back the limits of the materials used and the assembly processes. The team is driven by a stimulating creative energy. "Indeed, I ask the engineers to forget their technical training and qualifications, to accept tha²t they cannot control everything and to accept the challenges of creation, which at times may prove frustrating and uncomfortable for the engineers". Fine leather-wear is the Department's main activity, but which department also oversees ties, scarves, head-gear, tennis rackets, fantasy jewelry and even surf-boards. "Our activity is in line with sectorial goods and I regularly visit the slaughter-houses and the livestock farms to check out leather supplies – a very competitive area! We are lucky to be able to work with suppliers who are attached and faithful to the Chanel brand!" says Joseph Bravo "Some of the Paris seamstresses even worked with Mademoiselle Chanel!" Joseph Bravo is deeply attached to his family Region and still lives near to Compiegne even if he is often required to travel between France, the USA and Japan. "Not a week goes by when I don't drive in front of the UTC campus".

From the world of luxury to that of fashion

Joseph was admitted to UTC with a Bac. E [mathematics and technology] gained at the Compiegne Lycée ; he initially intended to qualify for a career in mechanical engineering, but instead he chose biological engineering – because, so he hints, there were more female students in this specialty! His end-of-course dissertation and placement with a company called BioCis, turned into his being recruited. BioCis was created by a UTC professor, a company specialized in reactive agents for medical research. "I found this experience very rewarding and it oriented my career to industries close to the medical and pharmaceutical sectors, including cosmetics", he explains? In 1989 at the age of 2C7, he became Manager of the bottling/packaging unit for Bourgeois® perfumes (Chanel), at the Compiegne factory, where he supervised a 60-strong team. That was his entry point to the world of luxury goods where his next career step was his appointment as Works & Methods Manager on the same site (in 1992) where his responsibilities were to manage the industrial organization, the investment plans, the launching of new products, including the perfume Allure® . "At the time, Chanel had the policy of launching a new perfume every 10 years. After this exalting phase, the launch teams benefitted from internal promotions. Thus, I became Director for Works and Methods (Fine Leatherwear) at their Verneuil-en-Halatte unit and that was where I discovered the world of fashion". Joseph Bravo left biotechnologies but with no regrets. "I even learned to use a sewing machine! When you work for Chanel, you credibility depends on your know-how! In 1998, he transferred to the Marketing Dept. at the Home Office in Neuilly, where he set in motion a new project management organization, for perfume and other beauty goods. From 2002 to present, he has been the Executive Operations Director (Fine Leatherwear, Fantasy jewelry and textile accessories). "Chanel is a "house" where we feel comfortable, given the family stock-holder structure, and its attachment to 'all things beautiful'. The entrepreneurial house culture is strongly positive and it is not unusual to cross the paths of colleagues who have been there for 20, even 30 years, despite the hectic work-loads and schedules".

BIO EXPRESS

1980
Admitted to UTC

1985
UTC engineering diploma in Biological engineering (GB), and recruited by BioCis

1989
Manager of the bottling/packaging unit for Bourgeois® perfumes (Chanel), at the Compiegne factory

1992
Works & methods Manager (same factory)

1998
Chanel, Project Management Director (Perfumes and Beauty)

2002
Chanel, Director for Development (Fine Leatherwear)

2007 to date
Chanel, Executive Operations Director (Fine Leatherwear, Fantasy jewelry and textile accessories)

Learning to adapt

Our UTC graduate – who has changed his subscription from the magazine Usine Nouvelle to Elle – underscores the way he learned to adapt. "Changing and adapting is a real added value and I pay special attention to this when I hire new people. Fashion simply is not an engineers' universe, seen as they are as people to would stop stylists from designing an unstable perfume bottle! One must never tell the stylists it is impossible – we have to find a solution with them, and this is a passionate quest, whenever you are enamored with the products". ■

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