CHAIR OF HYDRAULICS AND MECHATRONICS

Braking systems that resist super cold climatic conditions

Page 12

START UP

Ily, a phone that brings generations closer

Page 14

SUMMER SCHOOL

Innovative 'cuisine'

Page 18

utc Université de Technologie Compiègne

SORBONNE UNIVERSITES

OCTOBER 2015 ### N° **35**

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

Donnons un sens à l'innovation

Interactions

LES DOSSIERS

60" *to describe a placement !*

page 5

A new look at Innovation in French SMEs

Christophe Lecante, founder CEO of TKM (TecKnowMetrix) ***Page 11***

FROM THE PRESIDENT'S DESK

Pedagogical Engineering

The reports written by UTC student-engineers will astonish readers; they truly reflect the strong, original and specific features of our training model: over and above the core programme that draws on all forms of technology (technical, scientific, industrial, cultural and societal aspects, and even touching on political decisions), UTC offers not only a "responsible" model - where every undergraduate is free to choose his or her own, personalized, set of courses to attain the diploma award requisites, open to intercultural dimensions in all their diversity – but also a 'retroductive' engineering pedagogy that combines "understanding how to do things better" and "doing things to understand them better" and specialist themes open to global and transverse issues (health, energy, transportation, housing …). But above all other considerations, UTC deems it most important to train students by applying critical thinking to a world where there are just as many socio-technical system changes as there are new ways to tackle them. From this point of view, the role of social science sand humanities, of history and semiotics, of political sciences … are indeed primordial, since training in social themes cannot be reduced to simply adapting the student profiles to fit a pre-defined socio-economic environment, embodying highly utilitarian visions of social sciences. On the contrary, they must be able to acquire conceptual tools and methods enabling them to become technologists and also responsible citizens ready to participate in the construction of our future socio-economic environment. UTC's THS Department (Technology, Social Sciences and Humanities) already tackles this challenging mission with very high efficiency and constitutes a terrific field for pedagogical innovation and experimentation, as can be seen in the new core programme Hutech (Humanities and Technology). UTC's model combines agility, intercultural skills and awareness and risk-taking activities that naturally spark and fuel the imaginations of both the undergraduates and the alumni when it comes to innovation and the creation of start-ups such as Ily, Pipplet and Iperio that readers will discover in this issue. As Minister Genevieve Fioraso (Higher Education and Research) sated when the officially inaugurated, Jan.12, 2015, the UTC Daniel Thomas Innovation Centre "Pluridisciplinarity here is not a vain word here. I am tired of hearing that MIT is the only model to follow. Agreed, there are some wonderful things happening in Boston, but do we really need to travel so far for excellence? In France, at UTC, we can see tomorrow's engineers trained by 'just doing it'. ■

Professor Alain STORCK
President and Vice-Chancellor, UTC

Visit of a ministerial delegation from Bahrain

Tuesday Aug.25, 2015, a ministerial delegation from the Kingdom of Bahrain, including notably HE Majid Ali Al Nuaimi, Bahraini minister for Education and Dominique Chastres, French Embassy adviser for co-operation and culture, Bahrain, came to UTC, Compiegne, with a view to setting up a new university in Bahrain, on the model of the French Universities of Technology. ■

Prof. Alain Storck, President and Vice-Chancellor of UTC was raised to the rank of Officer in the French National Order of Merit

Wed. Sept. 9, 2015, Ms Genevieve Fioraso, Member of Parliament for Isere and former Minister for Higher Education and Research inducted and decorated the beneficiary with the insignia of his rank at the UTC Daniel Thomas Innovation Centre. ■

http://webtv.utc.fr/watch_video.php?v=GM28XMO45D3Y

UTC start-ups in headlines for Prizes awarded by the Business Club of the UTC alumni association Tremplin

The Renovalve startup, who have developed a mitral valve repair system (percutaneous access) were awarded the 'Promising Company' award. The 'Innovation and creativity' Prize went to the start-up Stillhuman, for its connected objects. 'EntreAutre' – a company that allows you to design your own furniture using 3D printers - received the Sustainable Development and Social achievement Prize. The Prize for an Industrial Development was awarded to Cardioline, who produce devices used in electrocardiogram tests. And finally there

RESEARCH CONTRACT

Neuro-Imaging life-cycle management

Given that the number and nature of neurological research images are rising extremely rapidly, the BIOMIST Project is designed to adapt a data processing system already used in manufacturing industrial sectors to facilitate neurological image data management. After all, the life cycle follow-up process for an industrial product may not prove so different from a follow-up in neurological research protocols … when it comes to data management!

What is the connection between the life-cycle of a product used in the automobile or aeronautical sectors and medical imagining used in neurological research? They could all in fact use a common data processing tool. The software package here is one commonly used for product lifecycle management (PLM) by manufacturing sectors to preserve throughout a complete lifecycle, the data appertaining to a given product. It is a protocol that enables the manufacturer to follow all the data from design stage to decommissioning and scrapping. Naturally, there can be no question of just applying a manufacturing PLM software to neurological imaging, but rather to draw from the underlying principles and build on these to create a tailor-made tool. In the framework of the second thematic axis of the call to project 'Contint 2013' launched by the French Government's HE agency ANR, the BIOMIST project (an acronym in French for Semantic management of biomedical imaging data used for research, ANR-13-CORD-0007) corresponds to the specification, proposing a module focused on biomedical imaging integrated in a Siemens PLM product.

Complex and heterogeneous data

"The problems facing engineers in the automobile or aeronautical worlds are identical to those for neurological research scientists", underlines Alexandre Durupt, who works at the UTC Roberval Laboratory, a partner to the project. The mass, the diversity, the heterogeneity and technicity of the data collected are really considerable, while the needs in terms of sharing them with numerous users, located in different sites, remains identical. The objective therefore consists of adapting an existing PLM tool to the specific case of neuro-functional imaging. In addition to UTC, the project partners are the Institute Charles Delaunay, the Neuro-functional Group (GIN, CNRS, CEA, and the University of Bordeaux) and an SME, Cadesis, specialists in integrated data handling systems for industrial customers. "Whereas a PLM tool is used to monitor the lifecycle of an industrial product, we substitute the concept of a scientific investigation", explains Philippe Boutinaud, Head of R&D at Cadesis and executive manager for the BIOMIST Project.

Analysing and defining data dependencies

The BIOMIST Project, now in mid-stream, has already succeeded in integrating a data processing system used in industry, feeding it with a data base containing neurological information. The data in question covers brain images and also information related to the groups and categories of patients that have been scanned: their behavioural, genetic or demographic data and characteristics. "It is now possible", adds Alexandre Durupt, "to submit queries about this information and to share the data and the answers". The system seems well adapted to the field of neuro-sciences, where the data is more voluminous and where the correlations and dependencies among data are more difficult to identify. In this context, BIOMIST focuses on the analysing and defining of the dependencies among data, using a graph display system to visualise the connexions. "The objective of the research scientists is to seek and validate various hypotheses related to how the brain functions. When you have a tool that shows the correlations that exist between different areas of the brain, this proves interesting for all the brain specialists" underscores Philippe Boutinaud. The design and development of the tool started in 2013 with a programmed schedule running 348 months so BIOMIST is essentially coming into the last lap and final stretch. Very soon, it will be produced as part of i-Share, a research programme about students' health status spanning several years. In the long term, the display graphs will be finalized and the product will then interest also the pharmaceutical world. "During the clinical and pre-clinical phases, numerous images have been added to the data levels collected as research scientists investigate the properties of new molecules", explains Philippe Boutinaud, for whom such a tool will enable the research communities to store, preserve and organise data and results. Preserving the data and monitoring research protocols is no longer viewed as a luxury occupation, inasmuch as the possibility of replicating a results is the only way open to guaranteeing a reliable result. This validation requirement is not anecdotic since a publication dated back to 2003 showed that almost one quarter of all research results published has never been successfully replicated. ■

d'infos plus ▶ Laboratoire Roberval : **http://webtv.utc.fr** > Nos séries > Les laboratoires de recherche
Visite hypermédia : www.utc.fr

RESEARCH CONTRACT

Heterogeneous airborne drones in flotilla formations for infrastructure surveillance missions

For large utility companies such as EDF (electricity) and the SNCF (railroads), the need to have flotillas of drones to monitor their widespread infrastructures, has become a necessity. However, the different flight modes of drones makes their inter-operability difficult. The AIRMES Project focuses on inter-drone communications to improve on their capacity to fly and manoeuver in safe formation.

In the field of aerial drones, whereas it is now relatively easy to control a single vehicle and even a fleet of homogeneous machines in flight formation, when you have to control a set of heterogeneous vehicles (different sizes, propulsion units …), the situation is one of 'sensitive aerobatics'. This is all the more self-evident when the machines are supposed to communicate and coordinate their moves to carry out a specific mission, or where an individual drone is supposed to carry out one task as a function of the other drones' situations/assignments. This is the overall objective of the AIRMES Project "Heterogeneous drones in air-fleet formations" as registered in the framework of the 20th call for projects under a single, interministerial funding scheme. Certified by the 'Pégase' competitivity pole and co-certified by three other poles, viz., Astech, i-Trans and Mer Méditerranée, the research programme is entrusted to the UTC-Heudiasyc Laboratory (UTC and CNRS) in a partnership with the national electricity utility EDF, the rail company SNCF and Aéro-Surveillance, a drone company (assembly and integrated systems). The project is supervised by Eurogiciel, a service sector company specialists in project assistance.

Co-operation to detect abnormal conditions

For large utility companies such as the SNCF and EDF, the need to monitor their widespread infrastructures, grid equipment and networks is vital but also leads to high-level costs in a context of high level technological challenges. There is no doubt that aerial drones have a role to play, both in terms of safety and also for maintenance surveillance campaigns. "Today we indeed frequently use drones for this sort of mission", explains Flavien Viguier, science & technology executive working for SNCF on the AIRMES project. However, to be able to operate a fleet of heterogeneous drones flying in formation, each equipped with specific sensors and analytical software for a given scale of inspection calls for a sophisticated level of co-ordination. "For example, a first drone dispatched to a site may detect large scale defects and then signal this to another drone with other different sensor equipment which will then move to the site and carry out an in-depth inspection of the potential, abnormal situation", explains Flavien Viguier.

Communicate to take action together

The task may appear simple but the implication is that machines with different flying modes should be capable of keeping close formation with each other and able to co-ordinate their actions so as to attain the best possible analysis of the situation. "The main challenge in this project is to develop a secure communication exchange among the drones", explains Flavien Viguier. On one hand, these aerial robots must be able to fly without colliding into each other and, on the other, we must be in a position to guarantee that no jamming of the communications between drones and command centre is possible. "The communications control box is limited in size, to comply with the world of airborne drones and also to ensure safe data exchanges with the machines which are vital to success in accomplishing the missions", adds Flavien Viguier.

Steps towards machine autonomy

The aim of AIRMES is to incrementally progress towards machine autonomy. Today an aerial drone is necessarily « monitored » by a pilot who can intervene if needed to abort/modify a mission. In, for example, the SNCF rail surveillance programmes, an SNCF expert backs up the pilot to provide his professional experience and, if need be, take decisions to optimise the mission in compliance with French railroad regulations. The AIRMES team wish to demonstrate that it is possible to improve notably on communication and fleet autonomy reducing the number of pilots and securing safer flights. With this aim in mind, the first phase of the project is to control a fleet in flight with several pilots and then move to a single pilot configuration. Progress here will be attained by increasing the level of autonomy of the drones enabling them to analyse the sensor images and take appropriate action in pursuit of the assigned mission objectives. Detection, image analysis, pattern/object recognition, decision protocols and coordination of actions … operating a flotilla of aerial drones raises numerous questions and challenges. The AIRMES project should commence in early 2016. The actors will then have three years to come up with valid answers to the questions raised ... and to discover and frame new questions for the future. ■

plus d'infos ▶ Laboratoire Heudiasyc : **http://webtv.utc.fr** > Nos séries > Les laboratoires de recherche
Visite hypermédia : www.utc.fr

was a 'coup de coeur' [heart-throb] Prize made to Pipplet who propose on-line language skills assessment. ■

http://webtv.utc.fr> Pipplet

Picardie Regional Authorities and UTC signed agreements with the State of Paraná, Brazil

UTC - instrumental in the creation of the Federal University of Technology of Paraná – has recently signed three agreements enriching its series of double degree cursus: a second thematic double degree in process engineering, participation in the new network of universities of technology, along with Chalmers (Gothenburg, Sweden), Polytechnique Montréal, l'UFRP (Brazil) and a framework programme for a new training course as a joint venture on the theme 'international innovation and technology' with Sr João Carlos Gomes, minister for science, technology and higher education. ■

The Science Fête at UTC with the Sorbonne Universities Cluster

3 000 school students came to visit UTC premises and laboratories, Oct.8-11 for the 24th edition of the annual Science Fete, enjoying for example a 'sweet rocket', WWI illustrated by a comedian, hands-on experience at tactile table demonstrations, virtual reality (VR) helmets... ■

http://webtv.utc.fr/featured.php?cat=13

Conference-workshops on Industrial Performance and R&D and challenges for Industrial Excellence

Tues. Oct 13, 2015, UTC and its partner KL-Management welcomed numerous industrialists such as Valeo, Decathlon, La Maison du Chocolat, Safran, Zodiac Aerospace, Saint-Gobain Toyota ... to share information and exchange on their return on experience and also to patriciate in two workshops on Excellence in R&D and the Challenges of Industrial Excellence. ■

http://webtv.utc.fr/watch_video.php?v=41XDA9SON3GX

RESEARCH CONTRACT

Standardised data for *high added value machining*

With a view to improving the digital industrialization chain for machining of spare parts for the aeronautical sector, the ANGEL Project, financially supported by a single interministerial fund that addresses collectively heads of HE establishments, industrialists and poles of competitivity, is focused on the issues of data. By introducing a common standard to represent and be used to exchange data, the Project aims at increasing productivity while limiting the environmental impact of production.

When an industrialist launches the fabrication of a spare part the price of which may be in the hundreds of thousands of euros, steps must be taken to ensure that errors are reduced to a minimum. Sometimes the parts have complex geometries, sometimes also there are specific materials that call for special care when machining them. "The idea of the ANGEL Project consisted in focusing on the information throughout the digital chain as it progresses from design stage to machining", explains Julien Le Duigou, a research scientist working at the UTC-Roberval Laboratory and involved with the ANGEL project, which ran for 2 years 2012-2014 and was financially supported by a single interministerial fund and managed by the Systematic Paris Region competitivity pole and co-certified by the poles ViaMéca and Astech. The project brought together industrial partners such as AIRBUS, SNECMA, MESSIER-BUGATI-DOTTY, CADLM, DATAKIT, UF1, Spring technologies and relies on inputs from research scientists at UTC and ENS-Cachan

An 'Angel' in the fabrication chain

ANGEL is an acronym in French standing for Agile Interoperable Cognitive Digital Workshop basically targets the aeronautical sector where machining parts represents huge amounts of money. Julien Le Duigou confirms that "the objective is to reduce the number of reject parts, to improve productivity by as much as 10% and to reduce impacts on the environment. The research work focused on the industrialisation digital chain, which starts in the CAD (computer aided design) where the geometric shape of the part is modelled and ends when the digital machine tool actually machines the part to specification. Between these two stages, various CAM (computer aided manufacturing) phases intervene to define tool trajectories and cut parameters for machining. The last but one task before finale fabrication is to model the machine process to check the code that will be forwarded to the machine-tool. Each stage calls for specific tools and software packages and therefore there are a variety of ways to represent the data.

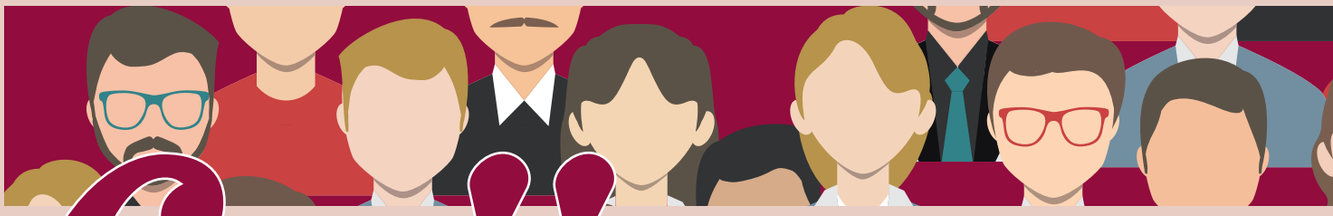
A common language to, mutually understand each other

"ANGEL provides a homogeneous common way to represent the data and therefore the data exchanges between equipment units all along the manufacturing chain", details Julien Le Duigou. "The protocol relies on an international standard called Step-NC which is covered by ISO standard 14649. By making the data homogeneous, ANGEL effectively cancels out one stage during the machining protocol: the post-processor used to transform the CAM file, where all the data needed to make a part, into a machine-tool interpretable code. This CAM file has a standardized data structure that can be shared and consequently it is possible today to capitalize and exploit know-how from information that is collected by existing tools", explains Julien Le Duigou, who goes on to detail "that it is this derived information that helps improve the work in hand".

Capitalising on experience

For example, numerous data relate to temperature, energy expended, lubricant volume consumed and the volume of machine metal or material chips produced. By studying the return on experience here, the industrialist should be capable of reducing certain wastes, enhancing a production methodology that is more respectful for the environment and opens the way to potential gains in productivity. The members of the ANGEL team have already planned to build up an information base to group together the data collected by the industrialists. The members of the consortium are thinking ahead: the plan is to undertake a vast data collection programme from the industrialists' Step-NC files, grouping together a maximum amount of returns on experience (ROE). Such a state-of-the-art base, once it has been analysed and structured will to open up numerous paths for further improvements on machining chains. ■

plus d'infos Laboratoire Roberval : **http://webtv.utc.fr** > Nos séries > Les laboratoires de recherche
Visite hypermédia : www.utc.fr



60'' to describe a placement!

UTC is well-known for producing multi-facet, wide-ranging engineers. They can be top-notch technically or skilful managers, or a mix of both – this is largely due to the cursus structure, with its 6 elective majors and 24 optional specialties that opens the way to innumerable professional opportunities. That is why there is no stereotype profile for a UTC graduate … This month's 'dossier' looks at this rich diversity and invites the students to tell us how they perceived their last placement, just before they are invited to their much-awaited UTC graduation ceremony? The following short stories, in a sense, help the future graduates to project themselves into a job context. We shall be able to follow their first steps. Twice a year, 1 000 industrial training officers, UTC's pedagogical tutors and the trainees meet for the poster session day devoted to the placements. The students have 15 minutes each to valorise their experience!

Bio-Engineering

Léa
specialty: Bio-medical engineering
Placement descriptor : **to head a computer project for pharmaceutical product preparations**

What are the requisites for the job? Léa knows them well. No doubt the team she was with will be hosting a new undergraduates in the coming weeks. So, Léa defines the profile for us. As she sees it, "it is impossible to be successful if you are not good in writing skills and inter-personal relations". Chemists, nurses, medical practitioners, paediatricians … Léa noted the functional needs expressed by each category and drafted a specification for the purpose of installing a new software package to attain new and better levels of efficiency. For the time being, paper 'rules the day', so to speak. So how should one proceed? How do you prioritise the tasks? The objective of Léa's placement and assignment was to computerize the management and handling of over-the-counter preparations, as per prescriptions. In other words, all preparations not sold in blisters or manufactured industrially. "Home-made", you might add. "If it's for children, the preparation can be cut or diluted". The spec? 80 pages long, before she got into the meanders of the public contract rules, legal aspects, testing and parametrization … In the context of the placement, Léa found herself a long way from signal or image processing. But we see how well computer sciences meet the needs of the practitioners and chemists. A fine opportunity for UTC graduates, provided you have a strong propensity for doing loads of work "alone".

Jean-François, engineer at Maquet
Cardiovascular and industrial supervisor for Kim Bui, on placement as R&D engineer

«Mission descriptor: Biocompatibility for vascular prosthetics. The standards applicable to this specialty are set out in twenty or so thick documents. Hence the interest to identify the needs and to "fill in the blanks" to comply with changes. Of course total mastery of English is primordial. All the relevant texts are written in Shakespeare's mother tongue. In a sense, engineers in the field become Swiss Army knives, displaying a clear technological sensitivity and other useful features.

Annick Deputy Director for the Data and Information Systems Service at the teaching hospital (CHRU), Lille and corporate supervisor for Léa's placement : It is somewhat unusual: the first requisite we have for trainees doing engineering work like Léa is that they really listen to you (and other actors too). "The way the medical world is organized 'mentally' is not the same as that for engineers. You have to listen to understand correctly how things work, and the needs of the medical personnel. Placements like these serve the personnel … and the trainees are occasionally allowed to enter the operating theatres". ■

Fanny • specialty: Design and innovation for bio-products • Placement descriptor: **specialist engineer in in vitro toxicology** Intertek, Fanny's host company has 1 000 laboratories round the world, 38 000 salaried staff. There are 15 agencies in France. They accompany the chemical and pharmaceutical sectors… in their quest for quality control. The assignment, precisely, consisted of assessing the anti-ageing effects of certain cosmetics. Without requiring animal (in vivo) testing, the tests are carried out at cell level. The accuracy of the measurements is to the nearest microgram (10-6 g) when it comes to detecting collagen. Density must be re-checked after a pause, wearing protection lab-glasses and gloves to carry out the manipulations under sterile conditions in a microbiological certified laboratory. So what was the interest for Fanny? As she says "close to the living world and Mother Nature". ■

Thibault, Regional Sales and Clinical Studies Director at Ethicon and Lucas' industrial supervisor, in his placement as an applications engineer

"Understanding the pathologies that are handled and treated by medical practitioners is part of the requirements for this placement … and Lucas was invited to attend operation in live theatre conditions. You need to have a certain degree of sensitivity to work on these themes. Moreover and it is not uncommon for us to have collaborators who first wanted to become doctors before doing their engineering diploma. We must bear in mi d that there is a patient on the operating table. And it is the job of the application's engineer to interpret what the 'op. theatre' system is indicating. It is therefore essential to be able to "read"' the clinical studies constantly.

Without a chef's hat but nonetheless wearing a 'charlotte' hygiene cap, Florence began investigating new meal-recipes for children. Also with here safety shoes, her white lab blouse (there's even a beard cover for men) and her uniform is complete. Obviously the question of taste lies at the heart of the study. So, where do you start? The client has set out a specification. Depending on the home-land market of the children consumers, the recipe will not be the same. Do they have spies normally in their diet? This is the kind of question that must be answered from the outset. Small test courses must be concocted and undergo tests before the company can move on to a larger scale, industrial production? "No artificial flavours, no additives … that is the basic rule to abode by. Another axis is to see how the proteins and glucids behave when cooked; heat is, of course, necessary to guarantee the sanitary requirements but what happens to taste?" Beyond the technical questions here, the placement also represented a position, where the trainee had to identify acceptable outsources, viz., companies who can prove they will respect the specification. Notably, for example, no pesticide, must be present anywhere in the course preparation cycle.

Florence
specialty: Innovation in foodstuffs and agro-resources
Libellé du stage : Placement descriptor: **assistant head of an optimisation project fora range of children's food by Babynov**

Gilles Director R&D at Babynov (Materna) and Florence's industrial supervisor : « At Babynov we work all around the world. This is very important when you have to consider taste issues. Depending on the market, the culture of tastes is not the same. In Germany or in the Netherlands, for example, small 'chunks' of food are introduced to the children's diet at an earlier age than in France, i.e., at age 18 months. The portions in the course are also more voluminous. These are typical of the constraints people like Florence have to bear in mind in this job area. And, believe me, the number of constraints is quite high for "baby food". Thus, in the course recipe, the engineers must have a real sensitivity to products, to tastes, colours and texture … in fact everything except being a blue-ribbon cook.» ■

Marie • specialty: Design and innovation for bio-products • Placement descriptor : **assistant R&D engineer at Bio Springer**

To begin, who exactly is Bio Springer? It is a company located in Maisons-Alfort (near Paris), specialised in making and selling yeast extracts, dry yeast powders … So, Marie's assignment was with what segment? Well, she was invited to work with yeast creams and their reactivity. Depending on the type of cream, in some cases, the production of yeast extracts simply cannot be envisaged. Her mission had three stages: bibliographic research; lab tests and interpretation of test results to certify (or disqualify) the technical process used. . ■

Computer Sciences and Engineering

Florian • specialty: Management of innovative projects • Placement descriptor: **project management officer for an investment bank**

So, Florian, what was this placement? You were recruited by Capgemini Technology Services and then seconded on mission to the Societé Générale Bank. What was the core of the mission? It consisted in following the budget and planning for a trader control system! This is a huge assignment with at least 80 persons working on it, in France, in India and it has been active since 2008. "With a position like this, it is sure that I am far removed from pure technology," says Florian. The aim is to optimize the monitoring process using what is called a data reporting mechanism.» ■

Cong • specialty: Data Mining • Placement descriptor: **assistant for contract business intelligence at Renault**

Miss Cong was involved in the upgrading of an application, known as the "Single problem list (SPL)". With 13 000 users spread over 43 different sites, this SPL has 200 simultaneous connections to the various collaborators of the familiar "lozenge" trademarked vehicles. The idea is to list any and all problems encountered during the design and assembly stages of vehicles. "These 'faults, when listed, can be managed and this helps improve the overall process efficiency. My six months placement were devoted to writing and adding new functions to this application". ■

In communications for a mobile network, nodal points are used as relays. And the main challenge for Murat during his assignment was to reduce the node load to "pass" more communications. At the same time the programmes had to adapt to the display capacity of the destination terminal device. Hence the interest to convert the gains in terms of profits. It also provided for service economies.

Murat
specialty: Systems and computer device networks
Placement descriptor : **optimisation of radio link protocols**

Michel advanced technologies research scientist at Thales and Murat's industrial supervisor : « After just one or two weeks, a trainee will have come to grips with this posting and will be ready to try various solutions. So what is the difficulty of the assignment? To propose developments for a software package that exists already hence the advantage in being able to communicate well.» ■

Sylvain • specialty: Data Mining • Placement descriptor : **social network builder at Amadeus**

Amadeus is a world leader for processing of tourism-related reservations and acts as a go-between between the airline companies and the travel agencies, cruise operators and car-hire companies … has built up a large-scale mine of data and personal coordinates. The idea behind this placement was to combine the data sources to make a social network. So, how do you go about this with some 300 M profiles to hand in the data banks? How do you identify the relevant links? Who will pay for the network (and its management)? There are numerous questions and issues ahead before "something that resembles Facebook® comes into being", explains Sylvain. And what would such a "network" offer and what could internaut suffers do with it? Why not build an assistance-platform to help "business travellers"? The contents, the ergonomics and the interfaces … these are some of the wide-ranging interfaces of the mission assignment. "The subject is open and free to explore", says Sylvain? ■

Gautier • specialty: Real-time systems and on-board computers • Placement descriptor : **a study of the dynamics of a controlled rocket nozzle at France's national space agency (CNES)**

In short, the nozzle is the exhaust muffler of a rocket. It can be directed automatically, left, right …. We read a lot about on-board computer systems; they can monitor and control the movements of the nozzle. Can we can calculate the forces that apply? Can we calculate how strong the stiffeners needs to be? The answers that Gautier provided rely on digital models and iterated diagrams, absolutely necessary to guarantee some of the constraints. ■

Mechanical Engineering

Work environment? An office, ultra-powerful computers (for modelling). How do component parts react under vibration conditions? What models should we build to understand noise sources? And how do you abate noise? These are non-simple questions in a field that has become increasingly competitive. But 'pure' modelling (without any manipulation) is frustrating for Thibault, hence the pleasure he took in making tests in an anechoic room, where sound source emissions are totally absorbed by the walls. What stiffeners should be interested between the parts? What parts contribute to noise emission? Various options are open and investigated.

Thibault
specialty: Acoustics and industrial vibration
Placement descriptor : **vibro-acoustic modelling for engine components and hydraulic pumps**

Sébastien advanced R&D research – an expert in hydraulic and vibro-acoustics at Poclain Hydraulics, and Thibault's industrial supervisor :
Studying vibro-acoustics is fairly recent Poclain Hydraulics, whose area of business covers agriculture, building sectors and public works. But, until recently also, the solutions came from hybrid use of digital models and live tests. There was no immediate satisfactory answer. The interest of Thibault's position is to be able to develop one's reasoning powers while carrying out the research assignment.» ■

Antoine • specialty: Management of Innovative Projects • Placement descriptor : **Programme and project manager**

The A350 is the latest Airbus Consortium aircraft and is being industrialized currently. For his 6 months' placement, Antoine was invited to think hard about the "ramp up" process, i.e., the way production is accelerated with increased work-loads on teams and machines. How, for example, can we make sure the suppliers will follow suit to the acceleration? "Coordination, programming and communication are the three key factors", explains Antoine. "The base-line for success here is to understand the flow patterns". So, what is the interest in having such a set-up, on an international scale? "The multi-cultural essence of the teams implies that you are constantly confronted with multiple approaches and analyses by colleagues. » ■

Pierre • specialty: Material and technological innovation •
Placement descriptor : **to prepare and present a fusion welding process**

The magic of the object operated on him. The 'object' – an aircraft; 'him' – Pierre. His assignment was to concentrate on a 'historic' profession in aircraft assembly: welding. What is the part? A rigid, articulated pipe, and the idea is to make the weld process automatic. So, with the help of some mathematics and his knowledge of material resistance engineering, Pierre is seeking to demonstrate that the welding process can be automated to ensure productivity gains, with 'repeatability' (as at Zodiac Aerospace). What is the challenge? To understand material deformation. ■

Industrial Process Engineering

Where did Léo Mercier do his placement? A workshop more than a lab. and with a worker's blue jacket. The start was bibliographic, classic and quickly became "field" oriented. So, what is a cathode? A block half a tonne in weight and 3m long. Development under lab. conditions is carried out with a small-scale reproduction: 50 mm high and diameter the same. At 50° (or at ambient temperature) … the production conditions are variable. Under these conditions, we can then measure mechanical and electric properties of the block.

Jean-Michel R&D Project Manager at Carbonne Savoie and Léo's industrial manager : « The project on which Léo worked had considerable scope. Eight salaried staff are working on this development, from technicians to PhD levels. Consequently, one of the characteristics we expect in a trainee is to be able to listen and talk clearly to others. Moreover, he or she must be able to carry out experiment alone, and check all the relevant parameters and product quality features as the experiment progresses … it is a very technological project and 100% scientific too! » ■

Léo
specialty: Industrial process control
Placement descriptor : **development of a fabrication process for a new graphite cathode**

So what is DSLM's credo at Compiegne? Research and production of high resistance resins used in the marine sector or for wind-turbine blades, but also to assemble cars (for their light-weight components) … "The site carried out an energy optimization campaign", explained Méor, hence the need to identify those site segments that consume too much energy; using daily measurements, the idea is to analyse the figures". Natural gas is expensive. Is it an issue that needs attention? How do you go about reducing consumption? « Paradoxically, when you increase the combustion temperature, this leads to a 10% drop in the consumption of natural gas. An annual economy of 60 000 euros".

Méor
specialty: Thermal energy
Placement descriptor : **Plant Support Process Engineer at DSM Composite Resins**

Virginie Plant Support Manager, DSM Composite Resins and Méor's placement supervisor : « Meor's assignment calls for lots and lots of calculations. But when you start analysing them, it allows you to reframe the issue, with an adequate dose of analysis … for a profession that will develop because of the application of the ISO 50 001 standard. Everyone now has to carry out energy consumption audits. » ■

Rula • specialty: Thermal energy • Placement descriptor : **Management of an engineering project, monitoring and implementation of a biomass station**

From the outset, Rula talks about an assignment somewhere between the office and the work-site and it doesn't matter what the project monitored is. It could be an eco-district, or an energy source improvement for a school or a hospital, or the installation of photovoltaic panel arrays or this biomass station at Limeil-Brévannes (Val-de-Marne, SW of Paris) … The name of the game is 'diversity' – the transitions are not always-s easy to conduct, upstream or downstream of any given project?. Should we install a PV panel roof for a sports stadium? Rula's job consisted of looking for the right products to offer the customer an adapted solution. The role of the biomass station? The energy performance test, in situ, must confirm the station's planned dimensions. We're talking about heating 2 200 homes. "So what are the expectations; to get the data together, analyse and present them", explains Rula. Communicating with the engineers, the sales-persons, the local authorities (mayors), as of 7 am on the work-sites. Team planning, management … technical skills alone are not enough.» ■

Mechanical System Engineering Sciences

What exactly is a lunambule? It is a rather obscure technical term for a plastic insert inside a hydraulic motor. For 6 months, Christophe was focused on this part for his placement with Poclain Hydraulics. How does the lunambule behave in water or when heated? Tests were conducted on special rigs to reproduce damage. The science applicable here is called tribology (friction) and you simply must use digital models to calculate possible effects.

Simon Christophe's industrial supervisor : « this is a purely R&D job, where the trainees must display self-reliance and polyvalent skills. They have to seek solutions, test configurations, propose models … it's a very "full" job. Hence the prospects to be promoted once the placement is over » ■

Christophe
specialty: Integrated mechanical engineering design
Placement descriptor : **damage studies for a 'lunambule'**

Guy • specialty: Integrated production and logistics • Placement descriptor : **production engineer**

Guy, who is in his early thirties, is the oldest student of his intake. He followed the course via the continuous education scheme. From cars at Renault, he moved to luxury model catamarans at the Construction navale de Bordeaux (CNB). His mission consists of analysing, sequencing and reorganizing the operator tasks (subdividing them into micro tasks) to avoid bottleneck situations, since every profession intervenes directly on the boat under construction. Who does what? At what moment precisely? With what equipment?... these are the sort of questions that Guy thought about for each branch (carpenters, electricians, plumbers, chandlers). What is the final aim? To optimise and organise better site productivity. ■

Charles • Modelling - optimisation of products and structures • Placement descriptor : **simulation of textile reinforcement for Hutchison pressure hose-pipes**

We all remember the famous question by Michel Chevalet "How does it work?" In reverse, Charles questions "how does it puncture? And to answer this he simulates hose-pipes undergoing usual engine stresses. Adding the associate vibrations too. These test enabled a demonstration of the crucial importance of the line-up of the textile weave. ■

Régis, Line manager for Construction navale Bordeaux (CNB)

There really is nothing similar in building a car and building a boat. Work in the latter case is far more artisanal and the workers are free to organize the way they assemble the parts. If something goes wrong, it's up to the site operator to decide what the alternate solution to solving the problem is. It is also a piece of new information that must be taken into account when you implement a site data management process. That information, once analysed, will help the operator to organize the work better. The big mistake you can make, however – and must avoid - is to show off some sort of superiority here. The technicians' artisan skills are vital ingredients to ensure final assembly success."

The head-light cleaner (fixed or telescopic) cleans, as the word indicates, a vehicles' head-lights. The result is better visibility ahead for the driver and an attenuation of the light beam dispersal that can blind drivers coming the other way. This is particularly true for vehicles fitted with xenon light-bulbs. Cyril's assignment for AML Systems was to decide how best to install the fitting so as to be the most discrete and the most efficient. What attachments should be envisaged for acrylic head-lights? What test rig should be built for certification? What plastic parts should be integrated? Every vehicle is 'special' and it must be possible to adapt the head-light cleaner mount. In this instance, the well-known Catia V5 CAD proved indispensable.

Cyril
specialty: Integrated mechanical design
Placement descriptor : **R&D engineer assigned the mission of fitting a head-light cleaner on a vehicle's front bumper (AML Systems)**

Jean-Louis member of the advanced studies project team at AML Systems and Cyril's supervisor: I :

« This project for a head-light cleaner is quite a tough assignment. But it leads on to a better understanding of engine environment and internal struts. When we consider "lighting" issues, we see that in terms of required skills the question is just as sensitive in China as it is in Europe – and this opens up some sizeable prospects » ■

Urban System Engineering

Léa • specialty: Integrated systems techniques• Placement descriptor : **assistant project management at Ingérop**

The company where she did her placement, Ingérop, specializes in consultancy and engineering. And the subject she investigated was no small one. The creation of a high speed train-line between Montpellier and Perpignan. The stages in the study are numerous: the mapping route, the infrastructures, the environment and its protection, the legal aspects (land purchases, identification of property owners) … this was all coordinated by Léa during her stay. "I had to make sure that the client (the SNCF railroad operator) received all my information. And to ensure that the data was coherent. This is the sort of technique we learn at UTC". It was also her job to 'tweak the ears' of the various expert and engineering teams who were working on each of these themes. "It's no easy task to show authority, especially when you are just a 'young lady'". She put her heart really in her work, looking closely at the bridges, viaducts and tunnels. There are no less than 80 'works of art' crossing valleys, rivers and roads. ■

Mélodie • specialty: Environmental engineering and land-planning • Placement descriptor : **Urban project management at Artelia**

Melodie's placement has lots of « buzz-words »; her sector was the OPIC for the districts that comply with ANRU. In short, her placement was with an engineering consultancy agency Artelia, specialists in organization, management and urban coordination for districts concerned by urban rehab. programmes. Demolition rehabilitation, land planning … There are numerous actors involved at each stage. The role devolved to Mélodie was to ensure everyone 'said their piece' thereby enabling an identification of possible problems, bottlenecks … and to build an overall operation planning schedule and monitor progress. Care also had to be taken with respect to people still living in the districts, so that they could continue to live "'normally". Hence the numerous trips to the site and photographic campaigns to record the progress. ■

Maud, what was the attraction of this placement? “Well, it was not just technique, but a cocktail that includes project management aspects”. And the mission contents? “The aim was to launch an energy saving rehab. programme, to convert OPAC accommodation to renewable energy sources such as firewood, to replace domestic fuel, to plan and build access ramps for persons with impaired mobility”. And where did this all take place? In Isère (local capital city Grenobles), with 300 accommodation units. I was out ‘in the field’ all day, every day, visiting housing, holding site meetings with the architects, the elected authorities, local companies, the beneficiaries of this housing. “Was the rehab. programme annoying for the locals ? And how long will it last? What will be the impact on the rental rates? Sometimes, seen from the outside, people don’t realize what engineers have to do … they are supposed to see everything from A to Z; we are integral actors in all stages of the rehab programme.

Maud
specialty: Environmental engineering and land-planning
Placement descriptor : **in charge of a rehab. programme for OPAC**

Anne-Marie Operations Manager for OPAC 38 (Isère) and Maud’s supervisor : « we can recall that OPAC 38 represents 26 000 accommodation units and 1 000 buildings. And OPAC is also required to guarantee that the rehab. programme goes through smoothly. My job is a sort of orchestral conductor, with lots of transverse contacts, with financial, legal, professional partners, with the State authorities; we have to be really flexible … depending on the circumstances, as and when they arise … And of course, sustainable development is at the heart of our accommodation and housing policy. Unfortunately, these professions too often remain confidential, secretive. » ■

The numerous specialties offered
in the UTC engineering cursus are spread over:

Bio-engineering (UTC-GB)
Combined engineering and life sciences, for applications in the agro-food sectors, in biotechnologies and health needs
gb@utc.fr

Computer sciences and engineering (UTC-GI)
Design, development and management of computer systems, hardware and software...
gi@utc.fr

Mechanical engineering (UTC-GM)
Design and implementation of products that call for electrical and/or mechanical engineering sciences and technologies
gm@utc.fr

Industrial Process Engineering (UTC-GPI)
Transformation of natural (or synthetic) raw materials into finished goods and design of more economical, clean and safer products.
gpi@utc.fr

Mechanical Systems Engineering (UTC-GSM)
Engineering, production and integration of complex systems aimed at mechanical and manufacturing industrial sectors.
gsm@utc.fr

Urban Systems Engineering (UTC-GSU)
Modelling and optimisation of multiple systems that constitute the domains and contractors in urban areas and building trades.
gsu@utc.fr

Technology, Social Sciences and Humanities (UTC-TSH)
Interdisciplinary analyses (management, philosophy, ...) of situations encountered by engineers today.
tsh@utc.fr

plus d’infos **http://webtv.utc.fr** > Nos séries > Stages et projets

A new look at Innovation in French SMEs

Christophe Lecante, founder CEO of TKM (TecKnowMetrix), an SME with 20 salaried personnel, specialists in entrepreneurial technological foresight operations, likewise Vice-President of the Richelieu Committee – an independent think tank association designed to encourage and enhance innovation in SMEs and President of the national IHEST (Advanced Institute for Scientific and Technological Studies). Readers will discover below his views on the strengths and weaker points of the French Innovation Eco-system, based on his personal experience and track-record as an entrepreneur.

Innovation in SMEs is often misconstrued with the start-up phenomena, but maybe it is the tree that hides the forest

In the early years 2000, the installation of business nurseries was something very favourable to the creation of star-ups that arise through public research. TKM is an excellent example – "incubated" in Grenobles as of 2003. Since that date, the initiative have been multiplied, including in the private sectors. We can rejoice that the topic of SME start-ups has become interesting again. But the other innovative SMEs, who represent a large fraction of the French industrial and commercial scene, generating hundreds of thousands of jobs, should not be forgotten. When we talk about innovation, we must combine former economic and industrial schemes with new and highly mobile forms of corporate structures. We can, for example, draw our inspirations from the US Silicon Valley model but, at the same time, we must stay lucid as to different entrepreneurial cultures and in the way we perceive business failures and also the far faster access to the market-place and to financial support. France's scientific and technological excellence and also the high quality of our Higher Education institutions (universities, engineering and commercial schools) are undisputed advantages. The size of the French market-place and the possible financial circuits to accelerate corporate creation do not allow us to produce French Googles or Apples, or simply ISEs in sufficient quantities. And because we cannot physically attain the necessary scale in France, the best of our start-ups are often taken over by foreign capital investors when they want to move to a business acceleration phases. It is essential that we find the ways and means needed to mobilise financial support to reach acceleration conditions and not just stay focused on the start-up phases. We must encourage growth of companies through a more rapid access to the market-place, incorporating a dose of economic patriotism via the major French groups and public purchasers (something along the lines of the famous US Small Business Act) and create the regulatory and cultural conditions for a real European economic area (EEA)".

> It is essential that we find the ways and means needed to mobilise financial support to reach acceleration conditions and not just stay focused on the start-up phases

Is innovation really something 'accessible for SMEs, via the R&D efforts deployed by the major Groups?

Most modern innovations come out of our SMEs. This calls for research in advanced areas that are too numerous and varies to be controlled in a single company structure. Even in very advanced sectors such as pharmaceuticals, there are increasing numbers and differing technologies running from chemistry to biology. Breakthrough innovations often occur at the frontiers between technologies. SME's explore these frontier-lands and therefore play a decisive role alongside the major groups. Moreover, they are both ''mobile' and 'agile', as we say. This implies that the enterprises and their personnel display varying cultures and skills. In a context like this, scientific prospective watchtower functions play a capital role to detect and follow through product and process evolutions? That us our key mission at TKM.

What paths should we explore to encourage, enhance and "free" innovation?

Well, to retain the "agile" » factor, I just mentioned, we must build up the links and connections between public research and these innovative SMEs. The relationships must be considered carefully, with a view to securing benefits to both sides. Research scientists discover places outside their lab environments to conduct experimentation and test protocols for their hypotheses and the enterprises consequently can look for higher competitivity through these innovations in the market place. Nonetheless, there is still a lot of ground to be covered between these two worlds; The French Government "Investments for the Future" incentive programme (PIA) allowed us to have new "areas to meet" such as the SATTs (accelerated technology transfer companies) and the IRTs (institutes for technological research) but they also contribute to 'complexifying' a situation that even before was not that simple! Every move that allows you to simplify and fluidify life for the SMEs, or helps to identify relevant research laboratories or seeks and makes for rapid ways to set up collaborative agreements should indeed be encouraged. With these new formulae that are consequent to the PIA, we still have to identify "good practice", good models and these really do exist … and then we must persuade the parties to adopt these proven, viable models. A 'small' country like France simply cannot afford the luxury of having 15 different models to propose to companies depending on the territory where they are (or wish to be) located. In a word - France, when viewed on a world-scale has the size of a Post-it®, albeit ingenious … but small nonetheless!" ■

*An intermediate-sized enterprise (*ISE) is a company with between 250 and 4 999 employees,*

DID YOU KNOW THIS?

69% think that collaborative projects encourage and enhance innovation

63% do not see themselves as candidates to the EU Horizon 2020 Programme

Source - Enquête Global Approach Consulting and the Richelieu Committee, questioning innovative SMEs

CHAIR OF HYDRAULICS AND MECHATRONICS

Digital modelling
for braking systems that resist super cold climatic conditions

Modelling techniques are largely widespread in aeronautics and the automobile sectors, enabling design engineers to gain considerably in time and efficiency as new equipment is being developed. In the framework of an R&D programme supported financially by the Picardie Region, the UTC Chair of Hydraulics and Mechatronics has set made an agreement to co-operate with an industrialist to design a digital simulator to develop a new braking system able to resist super-cold climatic conditions.

Occasionally, we see temperatures going down as far as -50°C … and sometimes rising to over +40°C. Coping with such extreme variations in temperature calls for very close attention, to be paid to certain sensitive system parts of the braking system. Correct functioning and reliability of pneumatic equipment depend to a large extent on the quality of the seals to ensure transmission of adequate pressure levels. Equipment manufacturers specialized in railroad transportation are especially interested in new design techniques that potentially reduce costs and lead-times in development for the purpose of proposing a specific range of brake systems for the Canadian, Chinese and Russian markets.

Considerable industrial stakes

Project SIM-Brake was launched in 2014 in the framework of the Picardie Region IndustriLAB programmes with the dual objective to master those component parts that are temperature sensitive and to draw up robust methodology to pursue development plans. “Research scientists at UTC have been given the mission to deliver an accurate representation of hydraulic and pneumatic part behaviours in a purely digital analysis and report”, explains Eric Noppe, a research scientist at the UTC-Roberval laboratory and head of the UTC Chair of Hydraulics and Mechatronics involved with the SIM-brake Project. In the regional context, it is the company Faiveley Transports based at Amiens alongside the CETIM (technical reference agency for mechanical engineering industries) who are the partners to this project. The work schedule is set out to year 20126, with a budget in excess of 1 Meuros and largely under the management of the relevant industrialists concerned.

> Nowadays, it takes some 5 years to develop a brake system for a railroad train”, asserts Eric Noppe whose ambition it is to cut the time needed by a factor 2 using digital modelling techniques

When modelling accelerates development

“Nowadays, it takes some 5 years to develop a brake system for a railroad train”, asserts Eric Noppe whose ambition it is to cut the time needed by a factor 2 using digital modelling techniques. “Development of these systems usually calls for a long series of iterations between the moment the system is specified technically and integration of the parts to rolling stock and certification”, explains Eric Noppe. Modelling moist lead to a truly clear breakthrough in methodology, significantly improving on the maturity of the product testes when it comes into to the final certification phase. Virtual prototypes are made at each stage of product development and this ensures a significant gain in time, avoiding the designers to have to backtrack to the workshop to correct design errors.

Of-the-shelf software with tailor-made parameters

These sorts of tools are largely used in the aeronautics and automobile sectors to guarantee the correct specifications and most efficient component parts/systems possible. This allows industrialists to reduce costs and lead times in development. However, they are not yet in widespread use in the mechanical engineering sectors, such as railroad transportation and agricultural machinery. When it comes to designing brake systems, “functional modelling become very complex indeed”, explains Eric Noppe. The modelling process must cover system geometry, friction, fluid (hydraulic and or pneumatic) mechanics and well as all kind of external sources of system disturbance, such as wide variations in ambient temperatures that potentially modify part characteristics. The modelling tools used already exist and can be purchased off-the-shelf but require fine-tuned parameters for the applications envisaged. They are based on theoretical knowledge of the materials and part shapes as well as the industrialists’ know-how and technical savvy. The parameters are then adjusted using the results of some basic tests that enable scientists to perfect the model. The research team only needs to await the end of the design period and the start of operational tests, scheduled in 2016, to ensure that the system is operational or whether it needs yet further returns to the certification stages. There is no doubt that the experience acquired will benefit to those industrialists who have expressed a demand for these systems. ■

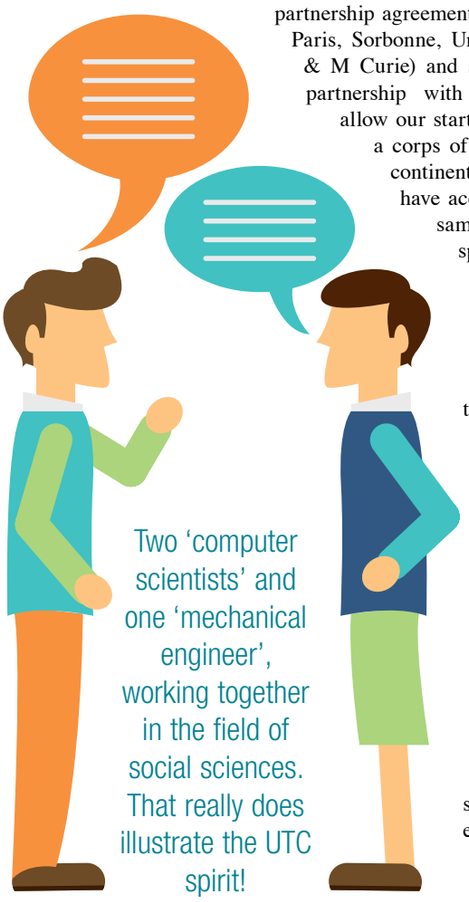
START-UP

To understand and be understood: that is the question

Fluency and skills in a foreign language, notably English, are absolutely necessary today in the professional world. To understand and be understood by people from every walk of life, with different cultures and accents is therefore fundamental to success. Unfortunately, the way languages are taught, especially English, at both schools and in higher education establishments, simply does not meet the need. And this is where Pipplet – a start-up created earlier this year by three UTC graduates - comes in to help fill the gap.

Pipplet in short, offers on-line language assessment. The objective is to assess the skills acquired with a view to communicating, defending as position or even expressing emotions in a foreign language. Oral skills are therefore predominant in the Pipplet test protocol, as Baptiste Derongs confirms: "During the test, we do not focus on grammar skills as is the case with 'academic language learning', but look rather at assessing a person's capacity to correctly understand a group of persons and to be understood by its members. There is a prerequisite minimum set of skills needed to be able to benefit from the Pipplet service, but naturally the questions used can be adapted in terms of the person's level. In fact, even if the person takes the test in his/her mother tongue, the assessment will check the ability to be understood by non-English native speakers."

It was during a stay in London that the idea of creating Pipplet dawned on Baptiste Derongs, a UTC graduate with the elective major in computer science and engineering. The decision was taken to set up the company, with two other UTC graduates he met in London: Adrien Wartel, with the same UTC degree and specialty and Matthieu Herman, whose specialty was Mechanical Engineering. "Thanks to the training we had received at UTC, we were able to identify an excellent level of complementarity between our combined skills. "My area is more with commercial prospects and business development", explains Baptiste Derongs, who is more concerned with technical aspects, and Mathieu who deals with design questions. Two 'computer scientists' and one 'mechanical engineer', working together in the field of social sciences. That really does illustrate the UTC spirit!



Two 'computer scientists' and one 'mechanical engineer', working together in the field of social sciences. That really does illustrate the UTC spirit!

The start-up was laureate in the category "emerging companies" at the i-Lab competition, July 2015, organized jointly by BPI and the French ministry in charge of Higher Education and Research. "We were awarded the maximum subsidy of 45 000 € to help accelerate our company's development phase", says Baptiste. Currently, we have a partnership agreement with the University of Paris, Sorbonne, University of Paris 6 (P & M Curie) and soon with UTC. "This partnership with the universities will allow our start-up to rapidly build up a corps of users spread over five continents. Our objective is to have access to a representative sample of the entire world' speakers. A Pipplet user will thus be in a position to exchange with between 50 and 100 other users, in several countries, so that the can become familiarized with different accents", adds Baptiste. Every person registered for the test is invited to answer fifty or so questions: 25 questions where the person is the speaker and 25 where the same person has to listen to another user and answer questions about what the he or she was saying. "For example, one user will explain how to go from point B to point A and a second user is supposed to find B, starting from point A. If both persons have correctly understood each other, we check their mutual understanding and that question has been correctly answered. Statistically speaking, we can give a mark that represents the person's ability to understand and to be understood." The Pipplet test relies on a corpus of questions which were established with the help of a professional linguist.

For the moment, the Pipplet test is available in English, but an extension to encompass other languages is already on the board. "Our system and the test, potentially, can be operated in any language, provided that questions are framed to suit the local cultures where it is spoken. Moreover, we have had lots of enquiries to develop the test in French. Of course, when you want to establish the test in another language, you have to assume there will be a sufficient number of persons who actually speak that language, with a certain number for whom it will be their mother tongue", underlines Baptiste.

A more long term objective is to have the test results certified, for example, for inclusion in a candidate's CV. "Users would receive a score chart when they have completed the test, indicating their degree of fluency in inter-personal communication", adds Baptiste. "The more users there are for Pipplet, the better the recognition of the test level certification. But to attain this, we must be sure that the test is passed under valid conditions, i.e., the person is not helped out by someone else".

Pipplet targets mostly business concerns, notably for the purpose of recruitment procedures. As Baptiste sees it, the evolution will consist of "proposing tailor-made tests for companies, to assess, for example, the ability to communicate in team formation, in a given professional area such as the automobile sector, or in banking and involving speakers in specific target countries such as China or India for example".

Another objective is to be able soon to offer the test for any private individuals who wants to assess their capacity to communicate satisfactorily. ■

plus d'infos **http://www.pipplet.com**

START-UP

Ily, a phone that brings generations closer

The objective of Ily® – developed by the French start-up Insensi – is to enable all the members of a family to communicate easily without needing a computer, a laptop or even a smartphone.

Ily® (a US buzz-word for "I love you") was the result of a simple observation made by Ilan Abehassara, CEO of Insensi. He realized that young children and seniors only had a limited access to modern communication systems such as computers and smartphones, and that, consequently, they most often borrowed devices from their parents to communicate together. That was why he decided to set up Insensi in April 2014. The Ily® is a wifi-connected fixed phone, with a tactile screen that allows the user to call out, to leave vocal messages and videos and also to share photos and pictures and drawings. The various contacts possible are signalled by a photo. An associate mobile "app" allows the users (notably the parents when travelling) to receive calls on their smartphone. Moreover, Ily® has a "presence sensor" which allows the device to display notifications of incoming missed calls, messages or videos when someone passes near (in front of) the device. When he set up his start-up, Ilan Abehassara secured the services of Olivier Costier, a UTC graduate in the elective major Computer sciences and engineering, who at the time was working at Aldebaran Robotics. "I joined the start-up in June 2014" says Olivier. "I really wanted to create something from design to market and to, be proud of my work when finished". This was something he felt even when he started studying at UTYC: "When I came to Compiegne (UTC), I noted that lots of technologies with on-board electronics and sensors were 'coming on line", so to speak. My own background was a first level diploma in mechanical engineering and so I thought it would be interesting to look more closely at these technologies. UTC is particular in that it allows students to compose a personal curriculum, and a freedom of choice as to the elective areas in which we could specialize. That was how I came to organize myself more towards electronics and computer sciences and engineering". Indeed, it was this personal profile with the combined mechanical engineering and computer sciences vision that the CEO of Insensi found attractive. "At Insensi, I am the mechanical engineer-cum-designer and I work with a design office. What I get from them is their visions and intentions and I have to transform these into mechanical parts that are assembled to form the devices. There are some very particular constraints in terms of the device components and my job is to integrate them as best as possible and to design mechanical parts that fit together perfectly". The design aspects are essential for a product like Ily inasmuch as it must present the clearest and most intuitive user-friendly interface possible. "In the case of the Ily® unit, we adopted a special approach", says Olivier, i.e., that once the design phase was over, we then chose how to integrate the technologies. This was somewhat complex but very interesting as we proposed an ergonomic style that did not in any way decrease its performance features. A lot of work went into the design to attain this extremely accessible interface and to ensure that the interactions were as natural as possible".

Ily® will be on sale in shops in the USA and in Europe early 2016, with a planned gradual expansion to cover the other world markets. "Physical sales in shops will be very important, given the customers targeted", explains Olivier Costier. The Ily® terminals will also be fitted out to accommodate new functions in coming years, as Olivier confirms: "We already have numerous development projects in mind, but we really want to propose a high-quality experience to our first costumers". ■

plus d'infos **https://www.ily.com**

PUBLICATIONS

Street science, street art

A bill-boarded airliner with an insect abdomen in the Paris Metro, a firearm with a vegetable but decorating walls in Tokyo or an aggressive flower on an advertisement for a famous Swiss watchmaker displayed in Vatican City, the gigantic green and black works of art by Ludo can be seen in streets round the world.

Often 'hung' in industrial waste-lands or in rapidly mutating city areas, these transient works are now part of urban and industrial art and history, somewhere between an abandoned past and an evolving future. A fine way to make art accessible to a large public. Prof. Christophe Egles, Chair of Biomechanical Engineering at UTC, a specialist for reparatory medicine and tissue reconstruction surgery, contributed to the monography "Ludo, Dualité", devoted to this street-artist whose biomechanical creatures – organic/mechanical hybrids …and which questions possible negative drifts of science. Our UTC research scientist has always been interested in the image science has in art. The walls of his laboratory have several paintings that evoke the world of research activities. Among them, a painting by Alain Eschenlauer representing a knot

– with a whimsical touch of humour - to symbolize the difficulties of certain scientific problems. An American artist, Jane Goldman, who produces brilliantly water-coloured genetic codes, came to spend a few days at UTC to take in the essence and aesthetics of scientific images. What Prof Egles would like to do is to propose regular residential stays for artists who wish to discover the day-to-day life of research scientists. "My struggle and my fight is with scientists who believe that artwork is superfluous and I want to open a window on something other than science to help us question even better the consequences of our research", he explains.

Black and green art

It was in the context of an exhibition at the Postal Museum in Paris, that Egles met the graffiti artist converted to producing unidentified vegetable and animal species. "I wanted to ask him about his vision of science and why he is so apparently pessimistic about the future", recalls Christophe Egles. We can readily agree that the weapons, skulls and poisonous plants on Ludo's artwork are ominously violent and black. The intentions of Ludo the street-artist are in fact more nuanced: his violent artistic transpositions level criticism more at possible misuse of technological capacities by rogue regimes or economic powers that do not care much about human lives or freedom, than against scientific progress per se. The artist shows his curiosity for research carried out in UTC laboratories. Indeed one of his projects is to use cell cultures in a future production. "Comparing scientific and artistic experimentation is rewarding, the first being constantly confronted with reality while the second depends essentially on the observer's subjectivity", concludes our expert in biomaterials with a strong inclination for culture. ■

« Ludo, Dualité » • 224 pages • Editions Gallimard

PUBLICATIONS

The education boom in Asia

Over the past 15 years or so, Asian countries regularly figure among those with the best performing pupils in international ranking systems. Could Asian-Pacific economic growth be the only explanation for this success story? The CIERP (International Centre for Pedagogical Studies) set about analysing the phenomenon and the evolution of teaching on the Asian continent, comparing methods, cultures and performance levels among various countries.

In 2014, in Paris, 45 personalities from 13 different Asian countries, from India to China, via the Philippines … addressed a conference on this topic. A special issue of the Revue internationale d'éducation de Sèvres, published last April by the CIEP presents the contributions of the speakers at the conference, adding their own analyses. "The venue provided the first occasion for Asian experts in the field to exchange on this level about differences in their pedagogical practices", says Alain Bouvier, Chief Editor of the Revue. Various lectures and workshops were devoted to examining the complex relationships between prolonging and upgrading the cursus, economic growth, global awareness and transmission of traditions and their values. The conference also served to demonstrate that there are in fact several Asian education models that produce very unequal results. Emeritus Prof. Jean-Marie De Ketele, Psycho-Pedagogy & Education, Catholic University at Louvain, Belgium analysed results for the PISA test, which covers reading skills, mathematics, scientific culture … and identified 7 countries with excellent performance ratings: Shanghai, Singapore, Hong-Kong, Taiwan, South Korea, Macao and Japan, compared with 3 countries in a group with lower performances than the world average ratings: Indonesia, Malaysia and Thailand. Various explanations were given to explain these discrepancies. With a higher GDP per inhabitant and less rural populations, the countries in the first group allow the parents to let (and support) their children enjoy longer studies. The cultural and philosophic contexts were also discussed by several speakers. To exemplify this, several speakers underlined the Confucian view that stresses the authority of the 'master' in South-East Asian countries. India, with its British colonial past and traditions going back more than a thousand years, called for more specific analyses.

Modelling teaching practice

While school level teaching is still mostly State controlled and has inherited and integrated local philosophical traditions, higher education in Asia has fully turned itself to encompass globalization and free trade competition. Alongside the United States, Australia is the foreign reference for South-East Asian universities. The Australian 'island-continent' attracts many Asian students and higher education there is a prime sector of the national economy. Prof. Anthony Welch, University of Sydney, proposed an analysis of the Australian model and its links with the Asian countries. It was noted that "shadow education" (development of extracurricular school support, complementing the public cursus) is one remarkable feature of the past decade. In some countries, up to 90% of the pupils benefit from shadow education. Mark Bray, UNESCO Chair Professor of Comparative Education, at the University of Hong Kong explained how South-East Asian families are attempting to make their children even more competitive on a global work market whereas in a country like India, private lessons served to compensate for weaknesses in the national cursus teaching. A comparative approach also opened new lines of thought outside the Asian educational spheres. Shanghai, Singapore, Hong-Kong, South Korea and Japan are often cited as models to follow or at least to be studied, with results higher than France or other European countries in reading and mathematics. One European country recently adopted the entire Singaporean school programme. The question is: are success stories like these reproducible? Several authors wondered what the financial commitments and governance systems were to enable such pedagogical systems. Analyses were also forthcoming as to the limits of 'over keen' competition among school pupils and the unending preparation for competitive examinations. According to one investigation, the pupils in South Korea consider themselves to be least satisfied. Could there be a lesson to be meditated here?... ■

"L'éducation en Asie en 2014 : quels enjeux mondiaux ?" • Revue internationale d'éducation de Sèvres n°68 avril 2015 • http://www.ciep.fr/

plus d'infos **www.sorbonne-universites.fr**

plus d'infos **http://utseus.com/fr/**

L'AGENDA

interactions.utc.fr • www.utc.fr

UTC diploma awards ceremony
Saturday Nov. 21, 2015
The official graduation awards ceremony will take place at the Espace Jean Legendre and at the Imperial Theatre, Compiegne. Godfather to this year's graduates, Mr Christophe Lecante, Chairman and CEO of TKM (Technometrix), chairman of the Richelieu Innovation Committee to encourage and aid adoption and development of innovation-intensive approaches in SMEs and Chairman of the Board at the Lille Institute for advanced studies in Science and Technology (IHEST). Mr Lecante will also participate in the Round Table session in the World Summit on Innovation to be convened in Nov. 2015 at UTC, Compiegne.

27th Edition of the Roberval Prize ceremonies
Saturday Nov. 21, 2015
The Roberval Prize ceremony will take place Saturday 21, 2015 at the Imperial Theatre, Compiegne. These Prizes reward authors (public at large, higher education, television, multimedia and a special youth section Prize) whose works aim at disseminating technology, techniques and associate scientific knowledge for the purpose of raising the level of awareness of a "technology-intensive world"

Conference to celebrate the 40th anniversary of digital mechanical engineering at UTC
Nov. 26-27, 2015
UTC's Roberval laboratory is organizing the conference to celebrate the 40th anniversary of digital mechanical engineering at UTC, where the industrialists in this field can catch up on digital modelling and simulation for mechanical engineering proposes, and also gain an insight as to future prospects in this specialty. The conference will cover the following themes: virtual certification, industrial challenges, damage and catastrophic failure, modelling code software, multidisciplinary optimization in mechanical engineering...

Honoris Causa Award
Nov. 26, 2015
Prof. Alain Storck, President and Vice-Chancellor UTC will award a honoris causa degree to Klaus-Jürgen Bathe, "Honoris Causa" degree to Prof. Klaus-Professor of Mechanical Engineering at Massachusetts Institute of Technology (MIT), founder of several companies and also author of a number of benchmark reference books in his field.

DIP Fab'Lab Winter School
Feb. 1-6 and 15-20, 2016
After a first week session at the Politecnico di Torino, Verres, the Winter School DIP Fab'Lab, will take place at the UTC Daniel Thomas Innovation Centre. The objective of the programme is to introduce methods and technologies for use in designing prototypes of innovative products, with the tools available in a Fab'Lab setting.

START-UP

'Design Thinking' upgrades the *fire-fighter's helmet*

When fire-fighters operate in a closed environment, they are often handicapped by lack of visibility because of ambient smoke. Maybe this will soon belong to the past, thanks to Iperio®, a camera attached to the helmet enabling the firemen to see through smoke. This is a technological 'gem' developed by Corentin Huard, Chairman & Co-founder of Ektos SAS and Alice Froissac, who graduated 5 years ago from UTC, also co-founder of Ektos.

« I am a serial entrepreneur!" claims Alice Froissac, who graduated from UTC in 2010 and was chosen as laureate for the "promising start" in the annual Engineers Prize organized by the magazine Usine Nouvelle et Industries et Technologies. But on the face of it, her initial HE training did not predestine her for this. "First I did a degree in engineering scene at University of Paris 6 (Pierre & Marie Curie) but I found it was terribly theoretical, "recalls Alice Froissac. "I had always been attracted by industrial design questions and consequently, instead of doing a Master's degree, I started looking for a course that could suit me better and UTC was one of the rare engineering schools that proposed engineering training with an opening to industrial design – I was able with a combined engineering and design profile to adapt to various situations and professions". After gaining her UTC diploma, Alice went on to follow a one year add-on course at the Paris-Est d.school affiliated to the Ecole des Ponts and became involved in a project to upgrade fire-fighters experience in smoky fire conditions thanks to a technology from Thales Optronics that allows you to "see" through smoke. "In June 2014, did not wish to pursue development internally and so Corentin Huard, who had worked on this project and myself decided to do so and we create a start-up business Ektos". It is in the framework of this start-up that they continued together to develop the invention, now under the code-name Iperio. An infrared (IR) camera is attached to the firefighter's helmet (it can be detached if need be). The images are projected inside the closed, ventilated helmet either by projection on the Plexiglas visor or via a monocular mini-screen (both approaches are under investigation). These images are also transmitted in real-time to the fire-officers outside so they too can have a vision of what is gaping on at the fire scene. The images could also be recorded, for training and return on experience. "We spent a lot of time with the firefighters to understand their needs for vision", explains Alice. This forums the base for "design thinking", viz., innovation cantered on user expectations. We observed their operational practice and behaviours in our search for solutions. This runs against the traditional approach in France, where first we tend to develop the technology and then look for possible application areas". To best define the firefighters' needs, Alice and Corentin worked with the Moissy-Cramayel fire-brigade. "Firefighters already use IR cameras but they are hand-held models which slow down their progress. During the tests, we realized that a huge number of constraints had to be integrated: the camera must not be too heavy, small enough so as not to hamper the firefighter's moves. It must resist high temperatures and physical shocks and also have a reasonable battery life". In order for the firefighters to "see" through smoke, as we said the camera is thermal IR based, enabling a distinction of a person lying on the ground and more intense fire spots. "However, for the following step, we want to explore use of the technique Thales proposed in the beginning, viz., in the near IR which really allows you to "see" through smoke, with varying levels of grey," adds Alice. But near IR a very expensive form of technology and require even more development work before it can be proven totally efficient in operation. Iperio could be used for forest fire detection on board Canadair aircraft, the pilots being able to localize fire-starts more accurately and carry out more precise water or retardant bombing. After a series of tests conducted in April, Alice and Corentin are engaged in fund-raising to develop the next prototype which is planned to be smaller and more functional. "We have already benefited from the BPI Frenchtech grant and we were laureates at the UTC-PEPITE-Tremplin Prize for student entrepreneurship achievements", adds Alice. Today we are looking for other forms of finance and partnerships. And, we are already thinking about developing our product for overseas markets – in a sense, fire-fighters round the world could be interested in a product like Iperio". But Alice and Corentin have even further ranging prospects; they would like to set up a second company, for training packages on design thinking and corporate coaching. Ah, yes! That is the life of a serial entrepreneur ! ■

d'infos plus ▶ Une Utécéenne primée au «Prix des Ingénieurs de l'année»: **http://webtv.utc.fr** > Notre quotidien > Valorisation & stratégie d'innovation

Do you need inspiration and/or information?

rendez-vous at our new UTC bilingual Portal www.utc.fr

Discover how innovation is invented in UTC's laboratories

- A **unique** opportunity to discover our laboratories with enriched multimedia presentations

plus d'infos utc.fr > visite hypermedia

Learn about emerging technologies

- **18 themes** exposed in French and English
- **Personalised newsletters**

plus d'infos utc.fr > interactions

Find the right training formula best adapted to your needs

- Use **intuitive navigation** on all Portal supports to learn more about training, research and innovation at UTC

donnons un sens à l'innovation

utc

Presented by **Toby,** UTC's 'Visitor from the Future'

Summer school 2015

Innovative 'cuisine'

July 20-31, 2015 the 1st edition of the International Summer School on « Culinary Science for Tastier, Healthier Food » was held at the UTC Daniel Thomas Innovation Centre. The event was co-organized by Claire Rossi, Head of the Innovation, Foodstuffs and Agro-resources elective major in the UTC Department Bio-Engineering, and the Directorate for Internal Affairs, this school brought together Chinese and Brazilian students as well as the Director of Internal Affairs and the Dean of the College of Science at the 'University de Brownsville - Texas, who came over specially to assess this original training course.

This Summer School is devoted to making an original blend between food sciences, technologies and French gastronomy. The programme objective was to learn how to easily improve the nutritional level and profile of meal courses and desserts, by modulating the composition, the textures, the cooking modes, while retaining maximum flavour of the original ingredients. The theoretical part of the School first examined physico-chemical process that make up a course preparation, the nutritional and functional fearer's and of the ingredients, the different texturing additives as well as the latest trends that allow you, for example, to substitute for fatty diets, sugar and gluten contents .. These concepts were then applied during the afternoon sessions in the preparation workshops. The participants were able to discover French gastronomy in their preparation of numerous courses, sauces and light desserts such as 'mille-feuille' layered cakes, chocolate brownie 'fondants' or macaroons … whilst applying innovative approaches in the food ingredient formulations. After two intensive weeks including numerous wine and food tasting sessions and three cultural outings to Paris, one to a Champaign country vineyard and to the nearby Château de Pierrefonds, the participants were sad to leave their aprons and mentors, but it must be added that they had not taken on a single gram in weight!

An adventurer in the land of innovation

When she turned 43 years old, Priscille Pingault was appointed Head of the Brussels sector for Aktehom, a consultancy agency for the bio-pharmaceutical industry. She joined this company in 2005 and now her new position confirms her conviction that the world of science and innovation is every bit as much a human adventure as a field for achieving technological feats.

Occasionally, human relationships prove more important than technical considerations. This distinction became very clear in Pricilla Pingault's mind when she was appointed in 2014 to head the new Brussels subsidiary of the consultancy agency Aktehom. The contrast was that in 1995, after completing her engineering diploma at UTC (elective major: biotechnologies), she observed during a placement in Columbia that the scientific and technological aspects of the mission were not the most important. "Indeed, the lab. work seemed rather monotonous", says Priscilla in retrospect. "Life and the context of an international research lab in a country like Columbia constitute a source of some amazing discoveries." Very rapidly, it became obvious to her that the world of innovation extended far beyond a purely scientific and technological viewpoint and called for integration of inescapable human, cultural and social dimensions. After a few years at Pharmaplan as a process engineer, Priscilla moved to a position of consultant with Assystem Agency.

Diversity of actors and considerations

Constancy is a job where you professionally meet lots of people, discover different scientific and technological contexts and where you are constantly confronted with new problems and issues", explains Priscilla Pingault. Not only are human relationships primordial but the job itself, as it is seen at Aktehom, requires that you be interested in the variable aspects of any question and try to come up with original answers that integrate a scientific, technical and human vision. "An industrialist is often a pinned down to the way he or she usually tackles questions and the potential actions envisaged often reflect the corporate culture", adds Priscille Pingault." The role of the consultant is to offer an external assessment that takes into consideration a wide-ranging set of considerations (regulatory, scientific, technological, human and societal …), providing at the same time an expert opinion that opens new paths for development adapted to the situation. "Consultants can bring a global knowledge about the domain, and benchmarking of other practices in the same sector by drawing on their experience and skills", explains Priscille Pingault.

Rising to meet the challenges …

The new head of operations for Aktehom Belgium agrees that her new consultant role suites her perfectly but admits that her early moves in the pharmaceutical sector were due more to chance than to deliberate decisions. As the saying goes, Lady Luck can do wonders, and so she decided to specialize in this profession 20 years ago. "Important techno-scientific innovations and rapid changes in this field make it a particularly attractive sector which offers numerous challenges", she adds. Did you say 'challenges'? As a qualified engineer, then consultant and now< operational manager for a new agency, Priscille Pingault effectively seems to love challenges. "When I attended courses at UTC, I leaned - as did the other students - to meet all sorts of persons with all sorts of backgrounds and to acquire a wide-ranging corpus of knowledge. Today my job is to establish and structure networks of industrialists in Belgium and to build, organize and develop a team of consultants capable of responding to new as yet unexpressed needs, and to demonstrate the same capacity used to gain an open, multidisciplinary view of the world, just as we learned to do during our undergraduate years", underscore Priscille Pingault.

… and adapting to new cultures

Now aged 44, the new Operations Head for Aktehom Belgium is fully aware that her new Brussels challenge can not only make heads turn but it also serve to assuage a high degree of curiosity, always on the lookout for novelties. If Belgium sometime seems close to France, the way people work in Belgium differs to quite a large extent. Consultants must be ready and capable of rapidly taking into their stride the specific cultural features of international corporations. ■

BIO EXPRESS

1995 : Graduated from UTC with the elective specialty Bio-Industries
1996 : Hired as Process Engineer at Pharmaplan
2000 : Consultant at Assystem
2005 : Senior Consultant at Aktehom
2015 : Appointed Head of the Brussels sector for Aktehom

utc Université de Technologie Compiègne

Interactions
interactions.utc.fr

Director of publication
Alain Storck
Editor-in-chief
Nadine Luft
Editors
Marilyne Berthaud
Olivier Moulergues
François Rebufat
Murielle Wolski
Design/Realization
L'agence
& Dorothée Tombini-Prot
Assistant
Corinne Delair
Photos p. 3-12-18-19
Eric Nocher
Translation by
Alan Rodney, BABEL TWO
Printing
Imprimerie Lesaffre

UTC-CS 60319
60203 Compiègne Cedex
www.utc.fr

Printed on certified paper
ISSN 2267-9995

With the support of PICARDIE LE RÉVEIL

PEFC-Certifié
Ce produit est issu de forêts gérées durablement et de sources contrôlées.
PEFC
PEFC/07-31-184
www.pefc.org