A NEW EXPERIENCE IN DIGITAL ENHANCEMENT...

GO TO PAGE 2

PIXTOO

THE FLOOR

‘Rev3’, a dream come true - Philippe Vasseur, President of the Rev3 mission

Page 15

EVENT IN THE NEWS

“Ready, steady, go”, for the UTC’s Foundation for Innovation

Page 17

ALLIANCE SORBONNE UNIVERSITÉ

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Interactions

PORTRAIT PAGE 3

PROF. ALI CHARARA, ‘TOGETHERNESS’ PERSONIFIED

PHOTOGRAPHY COMPETITION PAGE 4

WINNERS OF THE PHOTOGRAPHY COMPETITION WITH THE START-UP HEPIC

DOSSIER

Gas : can France be self-reliant by 2050 ?

FROM THE PRESIDENT'S DESK

In 1896, Svante Arrhenius published an article in Vol. 41, pages 237—276 in the review revue Philosophical Magazine and Journal of Science a paper entitled "On the Influence of Carbonic Acid in the Air upon the Temperature of the Ground". This paper quantified temperature variations at the Earth's surface, as a function of the changing levels of concentration of CO_2, taking into account the connection between air temperatures and the water vapour present in our atmosphere. As Arrhenius saw it, doubling the CO_2 level would lead to an approximate 4°C rise in atmospheric temperature. He also studied the carbon cycle and demonstrated that burning coal over a short period of time, i.e., short compared with the constants of geological eras, would lead to increased atmospheric concentration of CO_2.

In 1979, Jule Charney, American President of a group of scientists wrote, in "Carbon Dioxide and Climate: A Scientific Assessment" that a doubling of the CO_2 levels implied a temperature rise of 3°C ± 1.5°C. The question is: why should we pay attention to a two-fold increase of the CO_2 concentration level? Before the industrial revolution, the level was close to 280 ppm. Today we register 410 ppm with an annual growth rate of around 2.5 ppm over the past decade, whereas the rate of increase was only 1 ppm in the 60s. Supposing we were able to stabilize emissions at their current level, viz., 560 ppm, this leads to a doubling up of the CO_2 density by the end of the present century. This is the value predicted by the two scenarios in the RCP 4.5 and RCP 6, as studied by the IPCC in its 5th report published in 2013. Consequently, efforts to limit CO_2 emissions to approach a zero carbon balance in the long term has become a major challenge for Society. This month's 'Dossier' sets out the joint research programme and activities we carry out with UniLasalle, the aim of which is to develop novel methane production infrastructures, with an almost-closed cycle, from a carbon balance standpoint.

This is one small contribution from France in its endeavour to comply with commitments embodied in the Paris Agreement COP21, also known as the 2015 Paris Climate Conference. ■

Prof. Philippe COURTIER,
President and Vice-Chancellor UTC

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THE ROBERVAL PRIZE

The French-speaking nations top the billboard

The 31st Edition of the Roberval Prize, for the category "General Public" was organized at the Imperial Theatre, Compiegne, November 17, 2018 with an audience of over 500 persons attending. A second ceremony was held January 11, 2019 in Brussels for the category "Higher Education"

"The French language is a national treasure, we must never abandon". This assertion has been defended by Prof. Elisabeth Brunier, Head of the Scientific, Technological, Industrial, Cultural Service of UTC for, the past 22 years ever since she joined the Roberval Prize Steering Committee, then headed by Liliane Vézier. Appointed Delegate General for the Prize since 2012, Elisabeth Brunier entertained the ambition to see the Prize gain in reputation outside France. For this reason, the awards ceremony for the Higher Education category of the Prize was held this year at the Académie royale de Belgique, with a prestigious audience. Professor Didier Viviers, Secretary Perpetual of the Royal Academy and 65th Rector of the Free University of Brussels, gave a warm welcome address to the participants. Several scientific and cultural attachés from the French Embassy, Brussels, attended. The Delegate General for Quebec in Brussels also embodied the existence of a real French speaking scientific community. ■ **MB**

ELISABETH BRUNIER

WHY IS THE ROBERVAL PRIZE SO IMPORTANT?

The Roberval Prize is not a prize for scientific 'ad-mass' dissemination. It is a prize that upholds the aim to explain technology in French.
Several reasons underscore this objective and necessity. Firstly, we can see that student-engineers can more rapidly acquire and appreciate the nuances and subtleties during their learning curve of the world of science by exploring the latter and its domains in texts in their mother tongue, French. The category General Public allows readers to follow the rapidly evolving technology-intensive tools we use on a daily basis and also to be participants in ongoing debates. And we must recognize that French is structured, precise, nuanced and lends itself magnificently well to studying complex scientific domains.

CALL FOR APPLICATIONS FOR THE 32ND EDITION OF THE ROBERVAL PRIZES

Five categories : general public, higher education, TV, youth and journalism. Deadline to enter works, May 1st, 2019, as per instructions at http://prixroberval.utc.fr

ROBERVAL PRIZE LAUREATES 2018

'GENERAL PUBLIC', LAUREATE
Du merveilleux caché dans le quotidien – La physique de l'élégance • Etienne Guyon, José Bico, Etienne Reyssat et Benoît Roman • Éditions Flammarion

TV, LAUREATE
Le nouveau sarcophage de Tchernobyl • Martin Gorst • France Télévisions

'YOUTH', LAUREATES
Copain des geeks • Nathalie Lafargue et Jean-Noël Lafargue • Éditions Milan

JOURNALISM, LAUREATES
L'hépatite C, bientôt vaincue ? • Patrick Marcellin et Pierre Kaldy • Pour la Science

MEDIA SOFT-SPOT
La guerre des métaux rares. La face cachée de la transition énergétique et numérique • Guillaume Pitron • Les Liens qui Libèrent

THE STUDENTS AT THE UNIVERSITY OF LEBANON, LIKED
Forçage génétique • Yves Lévesque et Binh An Vu Van • Radio-Canada

THE NATIONAL ACADEMY OF TECHNOLOGIES OF FRANCE (NATF), LIKED
Intelligence artificielle – L'algorithme dans la peau • Frédéric Courant, Julie Desriac et Melvin Martineau • L'esprit Sorcier

UTC STUDENTS' CHOICE
Tout ce qu'on peut faire avec la soie d'araignée • Lucile Morin • Ça m'intéresse/ Prisma Media

PORTRAIT

The spirit of 'togetherness'

Ali Charara, high-ranking Professor at UTC, a specialist in control theory, a automation and robotics, notably in the field of "smart", autonomous vehicles, has been Director of the Institut des sciences de l'information et de leurs interactions (INS2I) at the Centre national de la recherche scientifique (CNRS), since January 2019.

ALI CHARARA

Ali Charara grew up during the war in Lebanon. What was his lodestone during the turmoil and mayhem havocked by those evil winds? Gaining knowledge and reading books were his refuge. As he saw it (and his family too), knowledge were the only rampart against ignorance, the Mother of Intolerance. The books and poetry too were rich refuges for ideas and meaning.

Lebanon has the cedar tree as is emblem, a truly unique cultural mosaic and a community puzzle. The country is rich in its differences, always in fragile equilibrium ('marginally stable as an automation expert like Ali Charara might say). A place where everyone learns to adapt constantly. After his lycée years, he was admitted, via a competitive selection to the Engineering School at the University of Lebanon, Beirut.

Ali Charara was a brilliant student-engineer – he made his first trip abroad to France (during his 4th year internship period which he carried out at the École nationale supérieure des mines de Paris (Mines ParisTech): "It came as a pleasant surprise to me just to be able to walk peacefully every day round the Luxemburg Gardens, Paris". A year later, in 1987, he was awarded a French Government grant and was thereby able to pursue further studies in Higher Education in France.

Following a DEA diploma (equivalent to today's Master Degree 2) at the Institut National Polytechnique (INP), Grenobles, he launched in to a PhD on the theme "Control theory and automation applied to active magnetic bearings", at Annecy. The key underlying the thesis is to "Replace ball-bearings, found in all revolving machines that hold rotors and stators in place, by electro-magnets". He successfully defended his thesis in January 1992.

Ali Charara was appointed lecturer at UTC in September 1992, joining the staff of the Computer Science and Applications Department. A university that has evolved a lot since that year. For instance, the premises at the Pierre Guillaumat building did not then exist. "In these days, staff were housed in 'Algeco's [French version of Nissan huts]", he underlines, "for a young research scientist cum lecturer, it was a most human experience to be in a user-friendly sized establishment with a sense of freedom and intellectual agility, things that were rare commodities elsewhere. For example, there was no lab.room for control theory and automation experiments.

I easily obtained the budget I requested from Paul Gaillard, then Director for Curricula and Pedagogy.

I placed orders for the equipment I needed and had a totally free hand to assemble the lab models" he adds.

Over and above his lecturing and research commitments, Ali Charara became rapidly involved in other scenes of academic life and activities. He notably headed an elective option computer engineering ad was in charge of PR work for the Department, elected to serve on the University Academic Board or as a member of the first CHSCT [an in-house institution that represents personnel, compliance with health and safety regulations and working conditions]. These were stages in his academic life that he found enormously enriching, from numerous points of view. "What I found interesting was to be able to work with others. Enjoying teamwork and a sense of 'togetherness' are things I value very much personally", he adds. In year 2000, Ali Charara obtained his HDR certification to oversee research work and he was elected to the National Committee for Scientific Research, in the category for lectures, research assistants who work, in other HE establishments or who have private sector appointments in industrial research. This Committee is the national jury for decisions as to admissibility for recruitment of scientists to the CNRS positions. Three years later, in 2003, Ali Charara was appointed tenured Professor at UTC, and also 'chargé de' for the robotics and control theory mission in the Department and today there is talk about setting up a CNRS Institute for Information and Communication Sciences and Technologies".

His Department is in charge of academic laboratories that carry a CNRS certification, e.g., the UTC HEUDIASYC Laboratory (an acronym for heuristics and diagnosis of complex systems) of which Ali Charara became Deputy Director in 2004 and Director from 2008 to 2017.

UTC's HEUDIASYC lab was created in 1980 and signed an association research partnership with the CNRS in 1981, a status that has continued ever since. It is a lab which, from the outset, had a pluridisciplinary format that integrates robotics, control theory and automation and operations research … something that was rare at that time. "Today we would replace "heuristics" by artificial intelligence, even if the trend is to speak more of a digitized approach and less of a symbol-intensive approach we used formerly", explains Ali Charara, underscoring that he learned a lot in the company of Bernard Dubuisson, the founder Director of UTC-HEUDIASYC.

With a view to fostering interdisciplinarity Prof Charara contributed to the setting up, in 2009, a federation of interdisciplinary research, called "Heterogeneous Interacting Systems", then in 2011 of the government, certified "excellence" laboratory "Master of technology-intensive systems", aka Labex MST2. A scientist at heart, Ali Charara nevertheless does not forget the socio-economic aspects of research. "This is something in the genes of UTC to associate high-level technology in association with the CNRS and high-level industrial partnerships", insists Ali Charara. Witness the creation, notably, in 2017 of the SivaLab (a joint lab between Renault Car Group and UTC-HEUDIASYC, to study autonomous vehicle location and perception systems.

"What I found interesting was to be able to work with others. Enjoying teamwork and a sense of 'togetherness' are things I value very much personally".

Likewise, the UTC-HEUDIASYC Lab also made investments at local and regional levels when the French State authorities prepared to launch the calls for projects in 2004 for the implementation of competiveness clusters. The various French regions were all candidates, including the Picardie Region. In order to keep abreast of events, the then President of the Picardie Region and the President, Vice-Chancellor of UTC gave prof Charara a mandate to coordinate the i-Trans Project , competitivity cluster devoted to transportation launched at the initiative of the Nord Pas de Calais Region with the Picardie Region as its main partner. This cluster prove a great success, with Ali Charara as its Deputy Scientific Director 2005-2009, indeed it was raked as a 'world-class' pole.

What an exceptional track record, that now sees him back at the CNRS, as Director (as of January 2019) of the Institut des sciences de l'information et de leurs interactions (INS2I). ■ **MSD**

 # THE JEAN BRICARD PRIZE AWARDED TO SOMIK CHAKRAVARTY. Somik Chakravaety, who gained his UTC PhD thesis carried out at INERIS, was awarded the Jean Bricard Prize, January 22, 2019. The thesis related to mechanical properties of non-cohesive powders and their impact on pulverescence. ■

 # UTC AND UPT (TIRANA) SIGN AN AGREEMENT TO INSTATE A DOUBLE MASTER'S DEGREE. Wed. Jan. 23, 2019, UTC and Polytechnic University of Tirana (Albania) signed an agreement to instate a double Master's Degree, in the specialty field of Complex System Engineering (CSE). UPT graduates who have had their M2 year validated in the CSE specialty, in the elective stream system learning and optimisation (AOS) or control theory, automation and robotics for smart systems (ARS) will be awarded the UTC-ISC Master's Degree and the Computer Sciences and Engineering Master's degree from UPT. ■

 # INTERACTIONS' IN-HOUSE MAGAZINE PHOTOGRAPHY COMPETITION

▲ Collision (definition): physical interaction between two or more bodies, leading to a modification of the state of movement of the colliding bodies.

Based on this definition, Pierre Feissel, a lecturer com research scientist at the UTC Roberval Laboratory proposed an entry for the competition we launched in Dcember2018, in a partnership with the start-up Hepic. His photo (front page) shows the collision of two water droplets, one which has just rebounded from the free surface of a recipient and the second drop that collides with the first, from the top, and was selected as the winner of the competition for this issue. "The photo does not in fact have a direct bearing on my research work, apart from that fact that I am personally keen on photography using a correlation of digitized images on mechanical test work, he explains. This particular shot was made using flash photography, synchronism with an apparatus that generated the water droplets, and it was the very short flash time that allowed me to freeze the collision ».


Pierre Bastard


Loïc Jumel

Two other shots were selected, presented by UTC students, Pierre Bastard and Loïc Jumel. In the first photo if you read binary coding, you see 010101010101010001000011.But question – can you decipher this string*? The second photo was taken during a workshop at the annual Science Fête, with primary school pupils! ■ *it deciphers as: UTC

UTC NEWS IN REAL-TIME CAN BE FOLLOWED AT WWW.UTC.FR AND ON

SOCIETAL CHANGE

From academic admission to the diploma award, how does UTC accompany handicapped students?


©PopsyImages

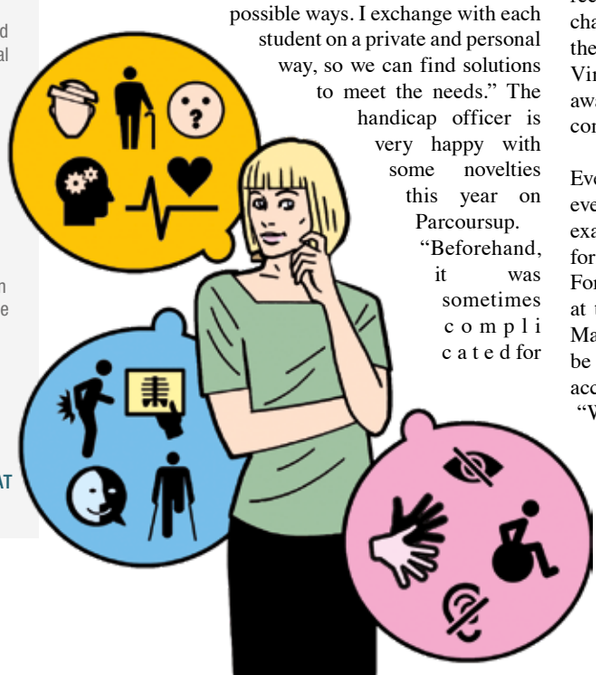
VIRGINIE LEVIEL

"At UTC, we do our very best to welcome, assist and accompany handicapped students", explains Virginie Leviel, UTC's handicap officer. She joined the University in 2014 and ever since she has accompanied every student requesting her help and understanding.

"My work starts the moment applicants make themselves known", she details. "On the French Parcoursup [on-line university level admissions] system, those secondary school lycéens who so wish can fill out a liaison form to detail the nature of accompanying measures they had during lycée years". UOnce the form has been filled out, it is forwarded to UTC's 'handicap unit' with a double purpose in mind.

Firstly, there is a need to organize a welcome for the applicants as they come to Compiègne to go through the admissions interviews. Then things must be prepared well ahead before those admitted arrive, in order to offer the best conditions to provide good learning conditions. "A few years back, for example, we put in a request for a sign language "comm" interface for a deeply deaf handicapped student who had just be admitted to UTC".

During each and all of the UTC "open days", and readily accessible, Virginie Leviel is present and reassuring. "When students come to see me, we analyse together the needs expressed and we try to respond is such a way that ensures them to do their studies and sit their exams in the best possible ways. I exchange with each student on a private and personal way, so we can find solutions to meet the needs." The handicap officer is very happy with some novelties this year on Parcoursup. "Beforehand, it was sometimes complicated for candidates to know who should be their correspondent in the establishment they wish to join. This year, we are clearly identified in the on-line training brochures"



"When students come to see me, we analyse together the needs expressed and we try to respond is such a way that ensures them to do their studies and sit their exams in the best possible ways".

UTC's handicap unit accompanies students throughout their stay at the university. "There are two major aspects to my assigned missions: 1° adapting conditions of study; 2° likewise for the examinations". For those students who so wish, we can help throughout the year, access to buildings, or note-taking. For these with more specific needs, the accommodations can be made at the tile of exams, such as the possibility on a lap-top, recruiting students to take dictated answers, or the chance to benefit from a time extension to finish the exam papers. Over and above these missions, Virginie Leviel looks after training and enhanced awareness programmes for the academic community at large.

Every year, there ae several 'enhanced awareness' events on the UTC campus. Last spring, for example, students were invited to attend workshops for "presentation" and "situation management".

For year 2019, new projects are in the pipeline at the handicap unit. A guideline was adopted in March 2018 which set out the main policy lines to be conducted in order to improve eve further our accompaniment offer to handicapped students. "We are all, at some time or other, confronted with cases of handicap. So, what is important here is to be aware and informed in order to be more at ease when addressing these subjects," concludes Virginie Leviel. ■ **GO**

Gas : can France be self-reliant by 2050?

An ADEME case study report published in 2018, authored in a partnership with GRDF and GRTGaz, demonstrated the feasibility of a "100% renewable gas mix by 2050" involving the main gas source production paths. It sets out an ambitious but possible objective. There are some major stakes to hand: independence vis-à-vis fossil gas, sustainable development, economic spinoffs for the regions … The Paris COP21 Agreement advocated that atmospheric temperature rise be contained to a figure well below +2°C, and that efforts be continued to limit temperature rise to 1.5°C

First target is to seek energy independence on fossil fuel gas. According to the latest figures available[2], the energy bill for France in year 2018 amounted to 47 billion euros, of which 10.3 billion were spent on procurement of imported gas. This indicates the high degree of interest were the country to be-come autonomous of imported fossil gas. We can note that in terms of Renewable Energy sources, France is in the rear with 16.3% in its energy mix at end 2015, REns accounted for over 19.3% of the world's energy capacity[3] and consequently there is room and an excellent opportunity for improvement here. Moreover in so doing, the country will avoid geopoliti-cal uncertainty for its energy procurements.

In a context of a search for sustainable development and the fight against poverty, the Paris COP21 Agreement aims at reinforcing a planetary an answer to the threat of climatic change. There is a climatic urgency where the Paris Agreement advocates a restriction of global temperature rise to less than 2°C with respect to pre-industrial levels and to pursue actions to limit temperature rise to 1.5°C. An energy mix with 100% renewable gas would allow direct CO_2 emissions to be cut fourfold. According to an ADEME[1] [French agency for the environment] scenario, the figure is ~63 Mt CO_2/yr.

The Paris Agreement advocates a restriction of global temperature rise to less than 2°C with respect to pre-industrial levels and to pursue actions to limit temperature rise to 1.5°C.

It is an ambitious scenario but could well be possible assert the gas industrialists. How is this? By producing biogas, by methanisation of organic wastes, which is a technology now seen as mature. And under this hypothesis, there still would be

a question of acceptability. Indeed, numerous voices of protestation can be heard in regard to spray-spreading of digestates, which smell foul – presented to date as "not smelly, green fertilizer, and a valid substitution of chemical fertilizers". Others single out the risk of leaks, underscoring that methane, CH4, has climate warming factor 25 times more than for CO_2.

Another way is to gasify dry biomass and the process called power-to-gas, which allows you to produce synthetic gas from sequestered industrial CO_2 and green hydrogen produced by using unconsumed renewable sourced electricity. These are two ongoing development technologies that should come more into line by 2050. Indeed, the theoretical amount of primary resources that can be mobilized is huge and the potential is just as great. According to the same study, the amount is 620 TWh, 390 TWh coming from biomass (wood and its derivatives, agricultural by-products, bio-wastes, seaweed), 205 TWh electricity and finally 25 TWh from recuperated energy (solid fuels, otherwise lost hydrogen …). Moreover, this source of energy would not be in a competition with "raw materials" uses (agricultural, forestry, biomaterials) nor with food uses.

If we consider conversion efficiency figures, the theoretical potential could lead to 460 TWh of renewable gas injected into the gas network, 30% of which would come from methanisation (up to 140 TWh), 40% from pyro-gasification (up to 180 TWh) and 30% from the power-to-gas technology (140 TWh), in a 100% renewable electricity mix, underlines the report. Demand should move downwards, from 436.5 TWh in 2015 to 293 TWh in 2050 thanks to improvement in energy efficiency factors, would clearly be largely satisfied. The cost to produce renewable gas would be in the range 105-153 €/MWh.

The competitive costs, as ADEME sees it, would be 86 €/MWh in 2050 for natural gas, taking into account a carbon tax at 200€/tonne CO_2. In short: a country self-reliant in gas, a renewable source, and GHG gas emissions reduced fourfold …

Finally, there are significant industrial and economic fallout for the country and its regions. Massive development of renewable gas would have a positive impact not only in terms balance of trade - trade deficit for energy imports could be reduced, according to ADEME, by some 60% in 2035 and 85% in 2050 – but also on the entire French economy. Indeed, renewable energies benefit in general from a strong territorial base since they allow for non delocalisable local energy resources. Already, several territorial authorities have decided this will be a major policy line in favour of economic development and regional planning. Also with significant fallout for future industrial development, innovation, employment…

Massive development of renewable gas would have a positive impact not only in terms balance of trade but also on the entire French economy.

1 www.ademe.fr/mix-gaz-100-renouvelable-2050
2 www.statistiques.developpement-durable.gouv.fr/tous-les-chiffres?theme=2
3 www.enr.fr/energies-renouvelables-dans-le-monde

A renewable gas

In a specific scenario devoted to biogas, ADEME demonstrated the feasibility for France to become independent vis-a-vis imported fossil gas by horizon 2050, biogas from agro-resources would, in the long run, amount to 30% of all renewable gas sources.

"Sites with agro-resources in France, are substantial and varied, depending on the Regions. But they do share a specific feature, viz., they mainly comprise agricultural resources, some of which have a high concentration of dry matter", says André Pauss, lecturer-cum-research scientist at UTC. But we should note that 89% of the methanisation units in France operate on a "wet path" process, converting, for example, bio-sludge effluent from water treatment stations, or bovine excrements, the latter amounting to close on 20 M cubic metres /yr. "There therefore is a major prospective challenge in solid path industrialization", he adds? The assessment is that 89 M tonnes of bovine excrements are available annually. Accelerating research, notably at UTC and at UniLaSalle who set up a scientific group, Solimétha, devoted to studying and implementing methanisation protocols for solid-path agricultural and agro-industrial by-products. This is all the more relevant in that the objectives in the pluri-annual energy procurement programming bill (PPE) and the energy transition law (LTE) relate to bio-methane and ae ambitious: moving up from 1.7 TWh in 2018 to 8 TWh in 2023, i.e., a mark-up of fivefold of current production level over a five year period and increase the number of methanisation units with 1500 installations in 2023 compared with 574 at

THIERRY RIBEIRO AND ANDRÉ PAUSS

the end of 2018. “There are objectives that serve the issue of energy independence vis-a-vis fossil gas as sustainable development, using a resource which itself is renewable, and the environment. In effect, non-emission of biogas into the economy and energy resource valorisation would induce “a reduction of greenhouse gases by some 3%, i.e., a division by a factor 4 by 2050”, asserts André Pauss? “Valorisation of digestates into organic entrants for agriculture also participates in the policy line for sustainable development that will lead on to form of a virtuous circle”, details Maurice Nonus, research engineer at UTC.

Research scientists in the Solimétha Group, are indeed considering liquid path methanisation, for example in the Project Algues 4 Biomethane. This

PHILIPPE COURTIER, PRESIDENT & VICE-CHANCELLOR OF UTC AND PHILIPPE CHOQUET, DIRECTOR GENERAL OF UNILASALLE

project managed by UniLaSalle, UTC and GRTgaz, plus five other partners, aims at “development of a process for co-digestion bovine manure and cropped micro-algae grown in photo-bioreactors so as to improve methane productivity” underlines Thierry Ribeiro, lecturer and research scientist at UniLaSalle. “Here again, we are coming to a virtuous circle. Micro-algae needs water, light and CO_2. But the biological transformation of organic matter produces, notably methane and CO_2. The methane will be injected into the consumer gas network, whereas the CO_2 will be recycled to produce new algae”, adds André Pauss. “This is a promising conversion path that can allow us to envisage large-scale production, he feels. To illustrate, we can point to public transportation systems that run on biogas. This is the case for certain bus routes in Paris”. ■

Towards a virtuous circle in a circular economy

Project Valodim, launched in 2014, aims at meeting the needs of the farming community to valorise their digestates via methanisation into fertilizers that are adapted to the local, competitive, crop contexts and come under a policy logic in favour of sustainable development, precision agriculture and is independent of imported gas.

In effect, in a specific scenario devoted to biogas, ADEME demonstrated the feasibility for France to become independence vis-a-vis imported fossil gas by horizon 2050 with the proviso we can develop all bioenergy option between now and mid-Century. These paths will produce digestates over and above methane biogas and these could also be valorised. For the farming community and farmers, this could constitute a major change but which call for substantial investments. A former category will aim to get out of the “all chemical’ options and to adopt a more sustainable approach for land and crop management. Farmers would profit from non-negligible economic impact: on one hand, there would be a drop in the cost of fertilizers, and on the other, extra revenues from sales of the methane produced. “All farmers are not yet ‘armed’ to undertake these investments, calling for up to ten years’ depreciation.

MAURICE NONUS

For example, for currently operating plants, the assessments read as “1/3 success stories, 1/3 balanced ventures and 1/3 failures. However, return on experience shows that both productivity and cost efficiency of the plant will improve”, underlines Maurice Nonus, research engineer and Valodim Project manager at UTC. And he also compares France (first agricultural country in Europe) and Germany: 390 methane production plants in France and over 10 000 in Germany. There is a clear margin of progression for France. “Methanisation is a natural process used to valorise waste organic matter. This would lead to production of both methane and digestates. There is also a major challenge to valorize the latter, i.e., to recycle nitrogen, phosphorus and carbon compounds, returning them to the soil and building a sort of virtuous circle here and a circular economy where almost nothing is lost and everything is transformed,” he explains. “The ultimate objective of the Valodim Project is to produce organomineral fertilizers that can be used directly by the farmers with today’s agricultural machinery”, he adds.

The Project initiators in the Valodim Consortium were fully aware of the context and group together one Small sized company, four Medium-sized companies and one major company, plus three research laboratories, viz., UTC’s TIMR, INSA (Toulouse) and IRSTEA (Rennes). Public authorities likewise are aware of the stakes. So how is the interest shown?

The 4.5 Meuros granted to the Valodim Project by the French Banque Publique d’Investissement (BPI), in the framework of the Government Programme for Investments for the Future or for competitiveness clusters (PSPC). ■

Dry solids digestion : a promising line of research

While 89 % of the digester plants in France operate according to the so-called 'wet' digestion process, mainly cattle slurry or manure, a fraction of the organic subsoils in France comprises a high concentration of solids. Hence the major challenge to address research issues in dry digestion protocols and technologies.

The first thesis, conducted and defended by Maël Mercier-Huat, relates to digestion of dry mussel farming by-products, i.e., how can one valorise sub-calibre farmed mussels (<12 mm thick) or with broken shells and hence declared unfit for human consumption. We are talking here of between 25% and 40% of total mussel production. Today, these by-products and co-products are dumped in the sea in predefined zones.

A foreseeable evolution of sea-farming legislation, viz., becoming more restrictive, will force mussel farmers to anticipate coming regulatory constraints and seek solutions.

The second thesis, conducted and defended by Manuel Alejandro Hernandez Shek, relates to identification of optimal operational parameters for agricultural dry matter digestion, in continuous and track-fed processes.

Current digester plants - mainly implementing "wet" bacterial hydrolysis - handle liquid substrates or matter in liquid suspensions. However, a large fraction of organic substrates contain a high concentration of dry matter. Developing reliable and cost-efficient dry digestion processes therefore is a major challenge for methanisation experts. The three research partners in this project, UniLaSalle, UTC and an industrialist, Easymétha, were fully aware of these prospects, the latter company developing and patenting an innovation for a solid matter digester with a continuous feed track, used to valorise mainly cattle manure – there is a prototype digester in operation at Talmas (80).

Both these above were "Cifre" PhDs, i.e., financially supported by the Association nationale de la recherche et de la technologie (ANRT) plus some funding by CultiMer France for the first thesis above and also by Easymétha for the second.

The third thesis, defended by Arnaud Coutu, funded by the European Commission's FEDER and by the Mocopée Programme was entitled "A systemic, combined modelling and experimental approach to determine optimization factors for solid state dry mater digestion methanisation".

The objective of his work consisted of proposing a user-friendly tool for multi-factor optimization that takes into account the various substrate compositions, as well as a study in hydrodynamic modelling of the inoculum outflow originating in the solid matter and integrate this model in a larger, complete model for the methanisation process.

This thesis investigated substrate specific to the Hauts-de-France region, but is transposable to accommodate other substrates, by way of the user-friendly tool incorporated. ■

Overview of three research axes

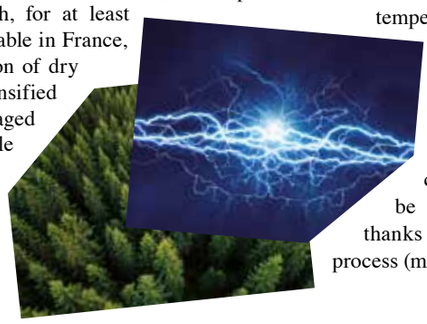
Focus on renewable gas production

Attaining 10 % of renewable gas in gas consumption and a minus 40% in GHG (greenhouse gas) emissions: these are the objectives set out in the national energy "code" (regulatory text) with the prospect of restraining the average atmospheric temperature rise of the Earth to less than 2°C and to pursue actions to limit temperature rise to 1.5°C. As ADEME sees it, a 100% renewable gas mix would economies about 63 MT CO_2/yr.

For ADEME, GRDF and GRTgaz, the objective is perfectly attainable. The condition is to move into an industrialisation of the processes, the three main renewable gas production processes, i.e., methanisation, pyro-gasification and 'power-to-gas'; this is all the more important that there is no lack of resources in France. Another special French feature relates to methanisation – the matter used in not in competition with a foodstuff utilization, as is the case for the maize corn in Germany.

Methanisation

This process sees a biological transformation of organic matter into bio-gas (methane and CO_2) and digestates, thanks to work by the microbes in a process known as "anaerobic digestion". This first form of renewable gas production has 574 units operating in France today and most of these are wet track methanisation digester systems. But another path, for at least part of the resources available in France, which have a large fraction of dry matter. Hence the intensified research, notably engaged by UTC and UniLaSalle in the framework of a scientific research group investigating new dry matter path treatments. We can note that gas distributors and the REn trade union, SER, have suggested accelerating the development of renewable gas exploitation, setting a realistic target of 60TWh for 2028, with more than 50 TWh of bio-methane coming from the methanisation processes. According to ADEME, in the long run, methanisation would amount to some 30% of the renewable gas mix.



Pyro-gasification

France has a large coverage of forests, with an estimated area of 16.9 M hectares, i.e., 31% of France and therefore there is obvious interest to develop the process known as pyro-gasification which, according to the ADEME scenarios, could amount to nearly 40% of a renewable gas mix. So, what are the underlying principles? The process calls for raising forestry by-products to temperatures between 900 and 1 200°C. When the process ends, on one hand, there is a solid matter (a waste mineral called biochar) and, on the other, a synthetic gas, called syngas. The latter can be transformed into methane thanks to a chemical or biological process (methanisation).

Power-to-gas

You cannot store electricity massively. And, at certain periods of the year, the electricity produced, notably by the wind farm generators, by marine tidal machines or solar panel stations, is not all consumed. Given that our neighbouring counties have much the same climatic conditions throughout the year, the spare electricity cannot be exported. Which brings us to a technological innovation called power-to-gas. And the principle here is to use the electricity to generate hydrogen via electrolysis of water. The hydrogen will then be combined with CO_2 to obtain synthetic methane, again my methanisation. ■

This « Dossier » was authored by Meriem Sidhoum Delahaye

INTERNATIONAL

Chinese students have studied at UTC for 40 years now

KEY-FIGURES

12 students matriculated at UTC in 1979

295 Chinese students at UTC (for engineering, master's degree and PhDs) in 2019

2005 : creation of UTSeuS (Sino-European School of Engineering University of Shanghai)

321 UTC undergraduates spend a semester at UTSeuS as of academic year start in 2008

End-November 1978, four personalities from the Chinese Embassy in Paris came to Compiegne, to negotiate with UTC for the matriculation of Chinese nationals. 40 years later, these pioneering students - who have since enjoyed prestigious careers - met up with Professor Luhui Ding, UTC ever since he defended his PhD thesis.

But they did not wait 40 years to see each other again. The members of "Class one" organize very regular get-togethers, with their husbands/wives and children. The next gathering is planned for April on the beautiful scenery of the shores of Lake Annecy. "It will be party-time for us. To mark the 30 years, we all got together in an Alpine winter resort, with our families. It was not easy to bring everyone together. Some were in other countries, in China, in the USA, in England, in Canada in Switzerland. But we made it …. it was just a question of organizing the event", sums up Prof. Luhiu Ding, who works at the Department of Bio-Engineering at UTC. That was the place where he alighted, Feb.26, 1979 with 11 other Chinese students. They were first invited to study French language, plus some extra scientific grounding before going to classroom for the standard engineering degree courses. In the then UTC in-house magazine Informations.UTC #201 for the week Nov.2-8, 1978 we quote "These contacts follow suit to negotiations between Chinese and French authorities from their respective Foreign Affairs and Higher Education ((Universities) ministries for the purpose of receiving Chinese students and research workers in France. We recall the recent visit by the Chinese Deputy Prime Minister. An academic delegation from Compiegne could travel to China to set up closer relationships with a University".

Hao, Jian, Xiaoyen and the others

In the group is Jue Wang, 20 years old, from Shanghai, Jian Lu, 18 years old, from Beijing as is Hao Sun, 18 year old and Luhui Ding, 19 years old, Jian E Lu, a young lady from Fuzhou 18 years old, Yun Tang, 19 years old, from Shanghai. Plus Junnan Huang, 18 years old from Xiamen, Yu Liu, 19 years old, from Shanghai, Minquin Zhang, 19 years old, from Beijing and Chummin Wang, 20 years old, as well as Xiaozhao Li, 17 years old, from Wuxi and Xiaoyen Lin, 19 years old, from Hangzhou. Two female and ten male students were part of a group of close on one hundred students sent to France by the authorities of the People's Republic of China, in the framework of a bilateral agreement signed between the Chinese and French ministries in charge of HE (Universities) and Foreign Affairs. "The first group should be followed by others. But of course, we must await the results of the experiment, which as we know, still carries numerous unknowns", we read in the end-February edition. Evidently, the experience was positively conclusive since many other groups have since come to France and are continuing to do so. When the first year came to Compiegne, they spent two days visiting Paris and Versailles. The visitors then began intensive French language classes, as a first stage of their studies at UTC. 32 hours/week in French lessons and all stayed at the Roberval Students' hostel to help with their integration process.

M. LUHUI DING, 4TH FROM THE LEFT IN THE GROUP PHOTO

UTC clearly marked my life

"Great careers, prizes, even a few Légions d'honneur have been embodied by China's 'Class One' of Chinese students registered at UTC-Compiegne. Once they had graduated, all of them enjoyed different career paths in France and abroad, in both industrial and higher education

UTC ARCHIVES SERVICE : A MINE OF INFORMATIONS

The help of the UTC Archives Centre set up in 2009, proved very useful for our reporter. So, let us zoom in to this Centre - the main aim of which is to collect, archive and preserve UTC documents.

For the past 10 years, the UTC Archives Centre, funded by the Picardie Reginal authorities and by the Greater Compiegne council has collected in excess of 2 linear kilometre of documents from every department and service at UTC – the academic Board, the "admin" services, the pedagogical and technical Departments, the laboratories, from lecturers, research scientists, student societies. The time of preservation depends on legal, practical, pedagogical, scientific value of the items, etc. "After the latter have been sorted, items with a historic, heritage … will be preserved indefinitely as sources that retrace the origins and history of UTC, thereby ensuring the memory function" underscores Claire Etienne, Curator for the UTC-Compiegne archives ensuring long-time preservation of the archives in secure premises, equipped with air-conditioning and a dehumidified atmosphere.

©PopsyImages

CLAIRE ETIENNE

A VERY VARIED SET OF DOCUMENTS

Among the archived documents, we find dossiers of UTC Founder President, Guy Deniélou, that relate the genesis of the university, the archives of the first Head of the Presidents' privy Cabinet including a set of the first issues of the in-house magazine, Informations-UTC, as of 1974 and the Press Review as of 1969, the minutes of the academic Board, a collection of analogue (silver-salts) photographs and early digital images, as taken by house photographer, Jean-Pierre Gilson since 1973, a set of video-cassettes of lectures filmed in the 1980s lecture hand-outs since 1976, student guidebooks, posters, students' reports, models for the design tutorials and lab work (elective specialty - industrial design), plus archival items offered by lecturers and research scientists when they left UTC, or retired, etc.

LUHUI DING

sectors. “We exchange constantly via WeChat and we are always in touch with each other. In my case, after my PhD in biomedical engineering, I continued at UTC as lecturer and gained my nomination as tenured Professor” details this father of two children. When he was younger he had not imagined carrying out studies outside China. “Perhaps I am the most laid-back house-proud of us all, but above all else I love teaching, concludes Prof. Luhiu Din. “Moreover you must appreciate that gaining a PhD is seen as very important to the Chinese. I has thought at one stage return to China, but I found myself attached to France and various other evets at that time changed the deal. UTC has marked my life”. ■ **KD**


THE 12 CHINESE STUDENTS UNDER THE BENJAMIN FRANKLIN PEDESTRIAN BRIDGE

4 BIO-MED TRAINING MODULES PROPOSED AT UTC

- **The Engineering Diploma in Bio-Engineering (diplôme de génie biologique)**, the biomed elective specialty
- **The Master’s degree in Health-care Engineering (Master mention ingénierie de la santé)** in the two streams – biomedical technologies and territories and the in medical devices and medical regulations
- **The specialist French Mastère in Bio-Med Equipment** (Mastère spécialisé équipements biomédicaux
- **Professional certification as assistant for hospital biomedical engineering** (Certification professionnelle assistant biomédical en ingénierie hospitalière)

INNOVATION / HEALTH

Inaugural Bio-Med rendezvous at UTC

Friday Jan.18, 2019 saw the first UC bio-med rendezvous, at UTC’s Daniel Thomas Innovation Centre. It provided the opportunity for around 100 students, lecturers, research staff and external professionals to update and exchange on the latest innovations and to become involved in a rich, dynamic network.

Friday Jan.18, 2019, the lecture-hall of the Innovation Centre was a “full house”, which came as no surprise really. UTC students, their lecturers, research scientists and engineers all studying and/or working in the biomedical field came over massively to share their experience and exchange on the latest developments, innovations, practices and regulations. Quick flashback to 1974 when UTC pioneered the first ever biomedical engineering programme, with the objective to authorize engineers to be recruited by health-care establishments, to manage technical medical equipment, up-to-date care, specific materials .. It was seen as a training interface between medicine and technology ad it rapidly revealed its full potential. ‘Fast forward’ to 2019. “Today we can observe biomedical engineers at work in most heat-care establishments”, asserts Jean-Matthieu Prot, co-organizer of the BioMed Day, with Isabelle Claude, both in charge of the Master’s degree health-engineering elective specialty. “And many in the audience were UTC graduates who have structured the bio-med profession and built up a strong region-wide network”. This special one-day event and bio-med rendezvous therefore provided an opportunity to demonstrate UTC’s strong dynamics in animating the network. “The bio-med field is changing rapidly today, notably in the light of EU regulatory changes enforced as of 2017”, explains Jean-Matthieu. “We see many new innovations in connected objects, running from personalised health care, to aids to diagnosis, in close liaison with research ongoing in our UTC laboratories. This in turn leads on to possibly new issues in terms of uses, safety not forgetting various ethical considerations and bio-med engineers must regularly update their knowledge bases”.

ISABELLE CLAUDE AND JEAN-MATTHIEU PROT

As far as the undergraduates are concerned, “the rendezvous allow them to get a feeling of their future professional practices, which depend largely on research conducted in academic laboratories and industrial R&D centres and we can note that their training evolves constantly alongside the probe areas met in the field”, adds Isabelle. Your diary rendezvous will be Friday January 17, 2020 for a second edition of the Bio-Med Day! ! ■ **MB**

MORNING SESSION LECTURES

Two lectures opened the morning session:

- Neurosurgery Accompaniment at the Amiens-Picardie Teaching Hospital (CHU): an original finance system by Alexandre Jaborska, manager in charge of bio-medical engineering and general hospital equipment;

- Elastographics: from research to clinical application by Sabine Bensamoun, CNRS research officer at UTC’s BMBI Lab (bio-mechanics and bio-engineering)

AFTERNOON SESSION – STUDENT PROJECTS IN HEALTH-CARE ENGINEERING

The afternoon was given over to Master’s degree student projects, in biomedicine and territories (TBTS) and medical devices and regulations (DMAR) in the health care engineering specialty. The students involved had been invited by various enterprises to come up with innovative solutions to certain problem areas they were facing. Amélie Paquet, Jin Xu and Keertika Sivakumar receive distinction in a reward for their work on good bio-medical engineering practice in the major regional hospital establishments also known as GHTs en France. “Ever since the law to modernize the French health services was passed in 2016, over 3000 health-care establishments have been grouped together into 135 GHTs. This coactive form of organization has an impact on care and biomedical service and the units are require to rethink the way they are organized.

The aim is for all patients to benefit from identical health care and biomedical services whatever the unit where they have been admitted. The good practice we propose will enable the various bio-med engineering services to adapt to the new organization pattern”.

LEAVING SOME DAY

ALICE AULANIER, A UTC UNDERGRADUATE, IN BRAZIL UNDER AN EXCHANGE AGREEMENT, HAS SET UP A MINI-WORLD FEMALE FOOTBALL CUP

So, Alice, where did you go? I went to a place called Maringá, in South Brazil.

Why Brazil? Why Maringá? I discussed a lot with numerous Brazilians registered at UTC. I just loved their culture and the language. I looked at various Brazilian cities where I could go and I wanted to improve my Portuguese.

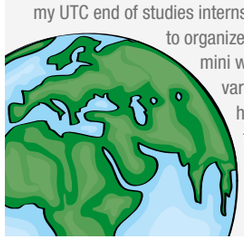
And what did you do in Maringá? (studies, internships…). Well, first of all, I did my exchange semester at the Universidade Estadual de Maringá, then my end of studies internship with an innovative startup working in the construction an public works field.

Tell us how you managed to set up and organize a project for a youth world football cup ? I have always loved football. I personally played the game from age 4 to 12. When I came to UTC, I joined a female football squad. If Brazil is a land of football, very few girls play the game. .So I got some friends together and we set up a partnership with the university's football training centre and proposed free training for a month. We circulated the news of the offer to all the local colleges and media and over 40 girls aged 12 to 14 who had never played football accepted. For the training sessions we chose balanced teams. Each team represented a different country at the mini world cup we staged in Maringá.

How was your project accepted? Oh, very well indeed! Numerous public and private partners (townhalls, universities) expressed their interest and helped us set up the project. We also benefited from an excellent media coverage. A local football club, also interested, started a female soccer team and close on one half of the girls who took part in the mini word cup continue to train every week.

What are the next steps? The idea now is to export the project as far as possible. We have signed partnerships with student societies in several countries, to programme 5 mini-cups this year (France, Bengladesh, USA, New Zealand and Niger. We have also juts launched a Crowdfunding operation on Ulule, supported by Coca-Cola®. And a month ago I registered my own association Inspiring Goals, the purpose of which is to encourage young women to practice sport in general.

And what are you going to do now? I shall return of course to France to present the results of my UTC end of studies internship. Then I'll go on to organize several other similar mini world cup events, in various countries and, hopefully, I'll be able to start a career as a female engineer!



■ GO

TELL US ABOUT YOUR PROJECT

We want to reduce CO_2 emissions at UTC

Reducing CO_2 emissions at UTC is the challenge taken on by 12 students since last February. "We really have a lot to do and we find that being able to contribute is just great".

"We did not each other till now and we met in the framework of an inter-semester pedagogical activity (API)", details Eliot Zarosinski a second year undergraduate studying urban engineering.

All 12 are following different course profiles but they do share a common desire: to work on a subject connected to energy transition. "This is a theme of great interest to us and we feel enormously concerned", he adds.

"We really have a lot to do and we find that being able to contribute at our level is just great".

To this end, the students recorded a global carbon print for a full week "This is a procedure that allows you to exhaustively measure and note CO_2 emissions in all the buildings and in all UTC activities.

"On the first day of the l'API, we had specific training with the help of the Association 'Avenir Climatique' to make us more and better aware of the stakes and then we launched our study"

To draw up their exhaustive list of UTC emissions, the students assembled a matrix model in the format of a large document that noted all items, sub-items, structures and categories of emission. "The major part of our work consisted of ensuring we had corrected adapted our empty matric to the specifics of UTC. He had to redesign the whole matrix from A to Z". This long, preliminary work also allowed the group to carry out some initial calculations. To illustrate – a return trip by car between the UTC

> *"We really have a lot to do and we find that being able to contribute at our level is just great".*

Benjamin Franklin and Pierre Guillaumat buildings generates close on 1.5 kg CO_2e^*. The average meal at the "Restau U" produces 2.25 kg CO_2e.

The students intend to carry out similar calculations for the hundreds of items they have identified thus far. "After one full week, we are still at the beginning of the project", details Eliot Zarosinski. "It's a programme that will keep us busy for several months to come and we shall ask to have the work registered in a CC framework".

It is consequently going to be a long-haul job and the group will seek to have the entire academic community committed to it. "We intend to do the rounds, knocking on the doors of various service heads to invite them to help us and my hope is that we shall thereby be able to access data of interest to us."

As of next summer, the project members hope to implement the first actions designed to reduce UTC's CO_2 carbon print "If the project goes well during the semester – and, rest assured, it will – we will have some detailed data about the items that emit the most CO_2 and identify some remedial

APIs, HOWZATT ? WHATZATT ?

As of the current academic year, UTC has launched Inter Semester Pedagogical Activities. What is their purpose? It is to enable students who so wish, to stay on campus a week more after their exams to carry out pedagogical projects in group formations Big data, urban or biology-oriented challenges were some arras on this inaugural week's API agenda.

levers" It is noteworthy that certain CO_2 sources are currently low level and they can be easily remedied even further, while others will be far less "reducible"

"What we have is a great challenge awaiting us", concludes Eliot positively.

The aim of this project is in line with the Greener Campus policy that has been advocated over the past few years at UTC and where we saw the arrival of some hardy Ouessant sheep last spring to offer the university an eco-grazing an eco-lawn-mowing experiment close to some of the academic buildings. Calculating the CO_2 benefits due to the presence of the sheep will, moreover, be part of the group's coming programme. ■ **GO**

*equivalent CO_2

MY FIRST YEAR AT UTC - EPISODE 2

"I spent a week skiing with a UTC student society"

For the second episode in the series « My Life at UTC », today we introduce Pierre Gibertini, a first year undergraduate, who sums up his first semester.

I must admit that the semester went by at an incredible pace! The final exams were on us only a short time after the mid-terms. My experience this semester has been rather positive. I was successful in nearly all my credit courses (CCs) – I missed out on one half maths CC and one in Spanish …). Retrospectively, I think my work method was not optimal.

I sort of left my revisions to the last minute and I did not use my Xmas holidays to get to grips with this task. That was not the best idea! … so when I got back from 'hols' I really dived into my work, especially in maths. So, even if I did not pass that CC, at least I had progressed in this specialty and I'll be able to resit this semester.

During the inter-semester break, I had quite a lot of activities. First of all, I took a week off to go skiing in Switzerland with the UTC 'ski society.

It was really great, and well organized, well, apart from the resort buses! I was staying at a great rental flat with 5 other friends. OK so we were quite a long way from the ski-slopes but we mad the most of the week.

Basically, I have a good level in skiing, given I went to resorts a lot with my parents when I was young.

I then went straight into the period known as TN05 (the mandatory worker's internship); mine took place in the family factory founded by my Grand-Father and his brothers with my Father and Uncle as the current Directors. The enterprise machines and assembled parts mainly for aviation needs. I had already done a worker stint in corn fields and that was quite exhausting. In the company workshop, I really had the impression that I was being useful and having a role in the evolution of the company – that was a truly terrific experience. I was also lucky to be joined by two childhood friends registered at UTBM (the university of technology at Belfort-Montbéliard) who also had to do a workers' internship

During the inter-semester break, I had quite a lot of activities

We don't as yet know if we shall be paid, but we were promised a bonus if we worked well (which we are doing, at this point in time).

Next semester, I don't yet know what courses I shall select. Personally, I would like to take on some mechanical engineering, plus some computer science.

Beyond the next semester, I've done quite a bit of thinking and I thought that next year I would lie to go abroad. But to be honesty with you, I don't know yet… UTC offers so many training choices. My GPA (Grade Point Average) is not exactly "super", which means I'll have to improve my levels and results … keep tuned. ■ **GO**

FOLLOW-ON

UN SERIOUS GAME COMME EXAMEN

[CF. D'INTERACTIONS 48]

FOLLOWING SUIT TO THEIR TRIP TO GERMANY LAST NOVEMBER, WHICH ALLOWED THEM TO VISIT "FACTORIES OF THE FUTURE", THIS YEAR END SEES THE SEMESTER END EXAMS FOR STUDENTS TAKIN THE ELECTIVE SPECIALTY 'PIL' FOR INTEGRATED PRODUCTION & LOGISTICS!

However, for these students registered for the PIL elective specialty and also for those taking ADL (aids to logistics planning) in the course on supply chains – they will not sit a classic paper and pen exam at a table, but will be invited to take part in a 'serious game'.

If you are wondering what an examination in a game format is like, Joanna Daaboul - who heads PIL and the supply chain lectures - who has the answer here. "It's much more fun! If the world is changing, so should pedagogy too. We can no longer entertain the idea of teaching as we did previously".

With its game-like appearance, the game is nonetheless taken very seriously by the students and they prepared for it throughout the semester, in team formation.

They act out their roles as managers of a paper flower shop and they developed their own supply chain; firstly, they put together their business plan and defined their target customers. Then they chose the locations for their production, how to optimize procurement of raw materials, transportation and paper flower stock storage between factory and outlet and finally pricing and outlet design …Also through the semester, the teams draft and hand in reports about how their supply chain is progressing.

December 13, the 'big day', at UTC's Daniel Thomas Innovation Centre. UTC students and staff were invited to play 'more or less demanding' customers, more or less in a hurry, etc. Once the flowers have been bought, the student shop-owners must assess their work with Joanna Daaboul. Attention! Regular audits will be made by competing teams, making inventories of stock at the end of each samples session, leading to new cost hikes. The students registered in this CC were thus able to validate their supply chain under real conditions and the choices made.

Apart from offering a very rich training experience for the students, this serious game approach also proved to be a great time for customers and the CC students to exchange and now they are always ready and enthusiastic about explaining how a supply chain operates!

** chaîne logistique*

HEALTH-CARE RESEARCH

Dr. UTC : an excellent "first" venue

BIOLOGY CONFERENCE AND LIVING TISSUE FUNCTIONS

With Drs Richard Ehman, Peter Amadio and John Hawse from the Mayo Clinic, Rochester, NY State, USA.
Monday March 11, 2019 as of 1:15 pm at the UTC Daniel Thomas Innovation Centre

On January 31, 2019, the first edition of RencontreSante [Health care] was convened at the UTC Daniel Thomas Innovation Centre. The event was co-organized by Sabine Bensamoun, CNRS research officer at BMBI-UTC (bio-mechanics and bio-engineering) and Professor Jean-Marc Constans, Head of Neuroradiology at the Teaching Hospital (CHU), Amiens (CHIMERE/IFF-CHU). The key guest speaker on the agenda was none other than Professor Bernard Devauchelle, Head of Maxillofacial and Stomatology Surgery, likewise from the CHU, Amiens.

Prof. Bernard Devauchelle, a famed maxillo-facial surgeon, was successful in completing the world's first part-facial graft in 2005. Thursday Jan.31, 2019, Prof. Devauchelle was among a group of medical practitioners from the CHU-Amiens and research scientists working at the UTC-BMBI Lab (biomechanical and bioengineering), which is a CNRS associative structure, who met to share their knowledge in a set of health related areas. In fact, collaboration among between scientists and doctors is pursued continuously, notably via the Institut Faire Faces and the Chimere team at the CHU Amiens. Results of the collaboration are to be found in numerous publications, patent claims and technology-intensive developments.

The one-day venue threw light on joint research efforts engaged between UTC labs and the CHU. Sabine Bensamoun, a CNRS research officer was in the steering committee that organized the RencontreSanté day. With her team, she has developed a non-invasive medical imaging technique that allows you to characterize and quantify the functions of face and neck muscles, before and after surgery.

"The technique implements the Magnetic Resonance Imaging (MRI) facility installed at the CHU-Amiens, and used by the Institut Faire Faces (IFF). The technique in question was developed for two clinical applications: restitution of facial mimicry and quantification of cervical fibrosis", sums up the research officer Bensamoun who also enjoyed a stay at the Mayo Clinic Foundation (Rochester, MN, USA), which is a case-book reference for medical research.

Understanding and doing

"As surgeons, our job is to do and understand, whereas, for research scientists, one first understands then does. The work carried out jointly between the teams from UTC, Chimere and the Institut Faire Faces, relies on the quality of the link between UTC and the hospital, and more particularly with the surgery unit where we work. The research carried out by Sabine Bensamoun at the UTC-BMBI lab has given us the opportunity to ask ourselves a long series of questions in regard to surgical operation and how one goes about measuring its efficiency", says Prof. Devauchelle enthusiastically who also avail do the floor at the RencontreSanté event to announce the laying of a foundation stone for the forthcoming and highly expected building for the Institut Faire Faces. Work will commence I 6 months' time for a delivery date in 2021 of the research centre devoted to European reference work in favour of disfigured patients, close to the CHU-Amiens. The building project, supervised by Prof. Bernard Devauchelle, will cover more than 4 000 m², with combined pluridisciplinary research and teaching rooms, plus an experimental surgical operating unit, a fully equipped imaging facility, a lecture hall, exhibition centre and other mobile wall research areas. "We shall, not however, be doing any real surgery on site", he concludes. "A strong focus of the new centre will be on training in an inspiring environment. The Institut Faire Faces has been engaged in this long process for more than ten years now ». ■ **KD**

CÉCILE LEGALLAIS, DIRECTOR OF THE UTC-BMBI LABORATORY AND DR SOPHIE RICOUSSE

JEAN-MARC CONSTANS AND SABINE BENSAMOUN

PROFESSOR BERNARD DEVAUCHELLE

FROM RESEARCH TO A CLINICAL ROUTINE

Magnetic Resonance Elastography (MRE) (or using ultrasonics (US)), is an imaging technique based on propagation of shear waves in soft tissues that allows you to quantify various mechanical properties (e.g., elasticity, viscosity). It has been applied successfully to study healthy and unhealthy muscle tissues, as well as to fibrous tissues. The objective assigned to this research project is to develop this non-invasive, medical imaging technique to quantify face and front neck muscles before and after treatments. "Assessing and correlation levels of fibrosis with the treatment administered will prove decisive when it comes to evaluating the benefit/risk factors for these patients", underlines Sabine Bensamoun. Elastography allows for objective measurements appertaining to the effects of the treatments and which could consequently be administered preventively to combat then sequels of cervico-facial cancers. The Saint Côme Polyclinique, Compiegne, already makes use of these new elastographic techniques thanks to the medical commitment and dynamic response of the Radiology Service, headed by Dr. Fabrice Charleux.

PHILIPPE VASSEUR

PIXTOO

A new look at

Rev3, a dream come true

‘Rev3’, meaning a 3rd revolution in the Hauts-de-France French Region, with one man and his team managing the progress, leading the Region to tomorrow’s world, an eco-friendly, connected and social world. The Chairman of the Rev3 mission was successful in bringing together enterprises, universities, politicians, citizens and associations to transform the Hauts-de-France, turning it into one of Europe’s most advanced regions when it comes to energy transition and digital technologies?

The world has become a very fast changing place, which has led to all sorts of environmental an associate technological problems. The period with its major upheavals also leads to a rarefaction of resources, climate change, pervasive robotics, big data and artificial intelligence. And as with each industrial revolution, the ways we exchange, produce, consume, move, create added value, or simply change. Rather than submit, the Hauts-de-France made the policy choice a voluntary and collective process to make the most of the upheavals and transforming the economy of our territory. “It is a very unique process that brings together politicians, left or right wings, scientists, corporate CEOs, clusters, associations or citizens who, in the Hauts-de-France, are committed and work to attain a sustainable world with companies who are both competitive and creators of jobs. It is in the essence of our DNA. The elected President of the Region, Xavier Bertrand, not only did not change anything in Rev3 and indeed, to the contrary, he added more credence to the operation by setting up CCI (Chamber of Commerce) Hauts-de-France and Regional teams who work together on the Rev3 mission”, witnesses Philippe Vasseur, the mission’s chairman. Philippe has a real passion for his Region, after discharging numerous political and economic functions, and he readily accepted his new and benevolent role as Chairman of ‘Rev3’

PHILIPPE VASSEUR LOOKS AT UTC

“As we see it, the high international reputation of UTC as a certified “excellent” HE, is a positive indication of the sort of locomotive UTC is. And this driving force is true for numerous areas that related to the Rev3 mission aims, notably for issues of mobility. Our cooperation with UTC lecturers and research scientists can help us organize some first class international events. UTC is not a regional ‘engineering school’ - it is a truly international school that has the same calibre and aura as major American universities. What a great privilege it is for us to have them in our Region!”

Transversality and pluralism

The ‘Rev3’ Mission was created jointly in December 2017 by Xavier Bertrand and Philippe Hourdain, President of the Hauts-de-France CCI (Chamber of Commerce) to aid and enhance a third industrial revolution in the Hauts-de-France. The day-to-day challenge is to make sure there is a good coherence in the projects and to begin new policies round positive, intelligent initiatives and to reposition the Region as a pilot example for a third industrial revolution, as was the historic cases with the first industrial revolution, with energy from coal and steam engines. “Our desire to advance is very strong. We are now known and recognized, notably by the spheres of policy-decision makers. Today, we must work more on how citizens get involved by paying attention to the people’s daily lives. Among the ten major structuring projects in Rev3, we have energy rehabilitation for buildings using agro-sourced materials which is a pivotal piece of ongoing work”, Philippe Vasseur explains. He sees the contributions and input of UTC research scientists as useful and even primordial. And indeed there are very many ‘Rev3’ projects in the Hauts de France. For example, the A1 motorway should become a sustainable, connected infrastructure. There should be carbon-free campuses, design and development of a bio-refinery and smart electric distribution networks (REIs) …”

Jeremy Rifkin, a superb totem

In a collaboration with Jeremy Rifkin, an American key-player economist, a specialist of economic and scientific forecasting, the Rev3 project is seen as a world-first for regional development planning policies, is clearly ambitious about its aims and objectives: to invent a novel economic model such that the Hauts-d-France Region becomes sustainable and connected by year 2050, with a 25% reduction of GHG emissions, a reduction of 60% of energy consumption and a 100% carbon-free zone. “When we launched Rev3, it was easy to raise a totem-pole. All the corporate CEOs sat and smoked the pipe of peace together”, underscored the Rev3 Chairman Philippe Vasseur. “Jeremy did not force his methods on us. We had numerous actors working on this, 125 just to define the planning. Jeremey came in as the catalyst, the ambassador who opened the doors as far as China, who constantly challenged our policy beliefs and continuous to do so”. » ■ **KD**

ENERGY TRANSITION IS SOMETHING FOR EVERYONE

RESEARCH SCIENTISTS AND FUTURE UTC ENGINEERS ARE ALSO COMMITTED ADDRESSING ISSUES RELATED TO ENVIRIONMENTAL CHANGE. FOR REGIONAL COUNSELLOR, DELEGATE FOR ENERGY TRANSITION POLICY QUESTIONS, FRÉDÉRIC NIHOUS, ENTREPRISE AND RESEARCH ARE AT THE CENTRE OF THE VIRTUOUS CIRCLE INITIATED BY THE 'REV3' MISSION.

The so-called regional fund and enhance the effects of the third industrial revolution (acronym (FRATRI) implemented by the Hauts-de-France Regional authorities in a partnership with ADEME (national French agency for the environment & energy issues) and accompanies and supports projects in line with the aims of the third industrial revolution and eco-friendly energy transition (TRI and TEE respectively, in French). The fund in 2018 passed the 18 Meuros mark and rose to 23 Meuros in 2019. It serves essentially to help local authorities set up their projects, especially for the smaller townhalls. "Energy transition questions also apply to countryside communities, indeed everywhere and for all of us", says Frédéric Nihous, regional counsellor delegate for energy transition policy questions. "We use tested efficient systems, such as wood burning stoves, but innovations and R&D are just as important. And this is where we need scientists and academics. The project "Algae 4" - in use of methanisation to provide energy for urban hear networks – is a joint UTC – UniLaSalle venture, in a collaboration with companies such as GRTgaz (cf. our Dossier, p.6 – A Renewable Gas) is a perfect example here. Nothing should be excluded and all routes are open for future studies. We expect a general mobilization. This will also have an impact on jobs tomorrow, and we see 'Rev3' affecting thousands of them".

THE WHOLE REGION IS BEHIND AND SUPPORTS 'REV3'

In year 2019, work will continue in the Hauts-de-France region in terms of sustainable development round the various actions which underpin 'Rev3'. "What we aim to do is to lever both on the macro scale with an ambitious strategic dimension, combining that of 'Rev3' and our favoured energy mix, and on the micro scale. Progress will occur in applying direct, flexible and adaptable measures for all, both private households and enterprises", he pursues. Numerous regional financial aid packages will continue and will evolve during 2019. We can cite grants to energy rehabilitation systems and devices for landlords and homeowners, such as 'AREL' which implemented experimentally in 2018 and valid till June 2019 to provide aids to less-well off householders so they can avail of insulation measures. "SDPEE, the public energy efficiency service is also greatly involved", he assures. "With this choice of a local public service, we aim at creating a virtuous, long-term, circle to develop our region; decreased energy consumption in built-up household areas, a better fight for families facing energy poverty and reboosting the local economy in terms of the building sector". ■ **KD**

INTERACTIONS ASKS THREE QUESTIONS ...

An economist assesses Rev3

Benjamin Coriat is both economist and tenured university professor at the Faculty of Economics at the University of Paris-13. Last September, he delivered an inaugural lecture at UTC on the theme of digitized land commons. Interactions interviewed him!

How will this 3rd industrial revolution make us change our future and hence our economy?

The current era reveals a powerful digital revolution which is taking hold in a context of unbridled globalization. It is a phenomenon that leads to a considerable increase in fractures which set ecological degraded conditions at then core of matters to hand. The remarkable feature is that these changes take place at a time when we can observe a revolution in property rights with increased forms of shared use rights versus the former exclusive private rights. This opens up the way to seeing new economic rights models. Let's look the example of Netflix which is a TV streaming channel, hence a sharing system. Likewise for car-sharing systems. Adding together the digital revolution with user rights priorities takes us into a new age; the realm of a shared economy. For better or for worse. The worst with Uber who took us back to antiquated "pay-by-task", *i.e.*, an unprotected system for the company drivers. The best is exemplified with Wikipedia, now a reference encyclopedia, with free unhindered access.

What virtuous effects could we see arising via the new world created with its collaborative dimensions?

Sharing allows us both to economize on resources since the latter are shared among users providing for a better access to a greater number of these resources. Culture (access to on line works), mobility (car sharing)…notably can be organize in the form of "commons". The questions of everyone's rights and obligations but also the issues of governance lie at the heart of building new commons. Many of our activities can be produced and experienced on a shared basis and would lead to better services than in the past. Open cooperation, as epitomized by Wikipedia, has demonstratively shown that in many cases it is much more powerful than the private company model.

Are sustainable and connected economies compatible?

Yes. The digital world is not criticized in itself. Everything depends on the economic models in which digital techniques are used. Uber and Wikipedia illustrate the two extremes. The major stake is that of ecological transition. Technology also has a role to play. Photovoltaic panel arrays, off-shore wind generators, cleaner and more economic production systems in terms of depletion of resources that would be impossible without technological progress. If they are based on the powerful assets of cooperation that sharing policies enable. The end results can be spectacular. To reach this point, certain routes must be abandoned. Today, 70 % of bank finance in the energy-related areas still goes to fossil fuel systems. We obviously cannot continue down this road. The question boils down to asking what technologies are best suited for what purposes? And serving the needs of what communities? ■ **KD**

BIO-NOTES ON BENJAMIN CORIAT ?

Benjamin Coriat holds a PhD in economics, he also has his 'agregation' in the same field. He has been the tenured professor at University of Paris 13 at the faculty of economics and management sciences since 1989 and also at the Centre of Economic Studies, Paris Nord (University of Paris 13 / CNRS). He co-chairs an association called "the disappointed economists" [collectif des économistes atterrés].

EVENT

"Ready, steady, go", for UTC's Foundation for Innovation

In early February, UTC was the scene for the launch process of the UTC Foundation for Innovation. Round the founder members, UTC, Tremplin UTC (alumni association), Saint-Gobain Glass France and Sopra Steria, benefactors are most welcome.

"The UTC Innovation Foundation aims at bringing industrial and UTC laboratory expertise closer to work jointly on new concepts. It offers an excellent opportunity for both UTC academics and undergraduates to operate in the field to better interface the world of industry and higher education," declares enthusiastically, Patrick Dupin, President of the Foundation and Deputy CEO of the Saint-Gobain Group, a major French business concern specialized in production, transformation and distribution of materials. The objective assigned to the Foundation: to accompany the development of public service Higher Education missions, in particular that embodied in UTC in its innovation mission. The UTC Foundation for Innovation will lead to forms of scientific and industrial collaboration, development of technology-intensive research and innovation, development of life on the campus, international mobility, quality of infrastructures and students' welcome, to quote but a few.

The spirit of co-development

"We intend to develop, via the Foundation, a scientific and academic collaborative project that will allow us to deploy and consolidate a project unite UTC's special skills and those found in an industrial partner, Saint-Gobain, in particular, Saint-Gobain Sekurit France", details Sylvie Perez, R&D Centre Director, Chantereine, Compiegne. This company already is engaged in three scientific research policy areas in its collaboration with UTC. "The first policy area is to work on new, future uses for our products. The second calls for integration of sensors in so-called smart surfaces of future autonomous vehicle which will lead to new uses, new technologies, adds Vincent Ricco, Director of Innovation at Saint-Gobain Sekurit France. The third policy thrust relates to "modelling, especially modelling to improve product design speeds and gain added efficiency". These are among the main changes for research ventures between UTC University and a front-line, key player industrial Group. ■ **KD**

"It is a partnership-based foundation and, on the basis of this statute, the project must be a shared format. The term 'innovation' includes pedagogical innovation, and international mobility and research in terms of knowledge transfer to answer the needs of various sectors of the economy. The underpinning idea is to build up a community that operates thanks to the benefactors".

Prof. Philippe Courtier,
President & Vice-Chancellor UTC

PATRICK DUPIN, PRESIDENT OF THE UTC FOUDATION FOR INNOVATION

SYLVIE PEREZ, R&D CENTRE DIRECTOR AT SAINT-GOBAIN RESEARCH, WITH DIRECTOR FLORIAN DE VUYST OF UTC-LMAC

PROF PHILIPPE COURTIER PRESIDENT AND VICE-CHANCELLOR, UTC

"As a research scientist, I see several areas of interest in working in a synergy. Already the fact of being an actor on large-scale projects witch an industrialist producing high quality glass and who aims at developing future forms of smart, transparent surfaces. In this field, we shall see evolving forms, design and functionalities".

Florian de Vuyst, director of the UTC-LMAC lab (applied mathematics)

'SOIRÉE' TO LAUNCH THE UTC FOUNDATION FOR INNOVATION

START-UP

Serial-entrepreneur

When we need to buy a book or a new dress, our first instinctive move is to surf on Internet. But that does not meet the requirements of small shops or main street in city centres which are becoming increasingly deserted. Having witnessed this in the suburban city of Vannes, indeed where he set up OJC Conseil, Oliviert Jullain – who graduated in 2002 from UTC in the major Computer Science and Applications – decided to launch Veando just a year ago.

What is the concept behind Veando? Shop owners register with Veando and can then be seen and questioned via their webcam by customers. "My aim is to reproduce human contact, but adding the practicalities of a digital world", explains Olivier Jullian. "Customers can ask for personal advice, see the products for sale and even order and pay on line before calling in to collect the objects as purchased. The shop-owner has no need to manage a product catalogue or take photographs. The solution is very easy to implement, using a simple i-pad and registration is free".

OLIVIER JULLIAN

Underpinning the site and servers is a very new technology- "We are indeed among the first French players in this field to use Web-RTC (Real Time Communication), which enables the navigator to take control of the in-built camera. Add in the pay on line facility, geolocalization and delivery services of goods purchased In essence, we have invented a site perfectly adapted to the needs of neighbourhood trading."

Veando is not the only start-up created by Olivier Jullian. Back in 2007, he set up OJC Conseil, an agency specialized in delivering Cloud Management solutions, notably analysis of expenses and purchasing policies.

Working on various strategic projects of major industrial groups (Faurecia, Eiffage, Ikea, Deutsche Telekom...), OJC Conseil (growing strongly with an annual turn-over that rose four-fold in just two years) has offices in France, the UK, Germany, Sweden, Switzerland, USA and Canada. ■ **MB**

www.veando.com • www.ojc-conseil.com

MORE THAN 90 SHOP-OWNERS!

Launched in Vannes in early 2018, the Veando site is currently being deployed in Lorient, Rennes and Nantes and of course shop-owners all over France can register as of now if they wish. "More than 90 shop outlets have already signed up", says Olivier enthusiastically. And our start-up was selected by the Village by CA, a business nursery of the French banker Crédit Agricole who will accompany our efforts to deploy the business nationally!"

Sport *a vector for success*

Every year sees many people making the resolution to take up sports. However, this is not always easy to combine sports and a professional activity. Thanks to Street4fit, a start-up create by Jaafar Elalamy – who graduated from UC in the major Computer Sciences and their Applications – it is the sports coach who comes to your company workplace! For the coaches this also means being able to make a livening from their passion. And for the workers? No more excuses for not doing a bit of sports now... go and get your running shoes on!

Sometimes, creating a start-up can follow suit to a simple observation. When Jaafar graduated from UTC, he noted that office hours do not leave much time for workers who want to engage in sports activities. He also noted that high-level sports (wo) men from unfavoured city neighbourhoods find it difficult to secure jobs in their specialist area, despite have the requisite skills. With Karim Fathi, Mounir Bourhrara and Pierre Guyon, his associates, the group decided to solve bot issues together by creating Street4fit in 2017. This start-up organizes sports activities on business premises (cross-fitness, cardio-training, English boxing, zumba, yoga...) in classes given by high level athletes who come from unfavoured areas. "Our start-up is in line with Social Tech ideals, in that it allows the sports(wo)men to indulge in their passion and to earn a decent living", asserts Jaafar. "Street4fit offers to pay for the needed sports coaching diploma and guarantee of a stable salary. Moreover, it also cares for the needs of well-being for the workers. Doing sports activities at work enhances the interactions among staff colleagues, quality of life at work and in fine productivity".


JAAFAR ELALAMY

One they agreed to the underlying ideas, it still remained to prove the concept viable. Renault Group helped out here. "And today we organize sports classes for Renault, Doctolib, Saint-Gobain, Airbnb, HEC Paris, Station F and other organizations", adds Jaafar. And what about the prospects for 2019? The founders and reference coach Tarik Yacoubi have set themselves some strong objectives: delivering sports classes to close on 100 companies and to finance the required diplomas for ten more coaches. "The Paris 2024 Talents competition jury took note of our start-up's work and aims. We want to rank among the 24 start-ups selected to benefit from support from Paris, for 'more solidarity' in Paris, more sustainable, more "inclusive" by horizon 2024!" ■ **MB**

www.street4fit.fr

GREEN INNOVATION

A start-up incubator

Launched by UITC and UniLaSalle, ITerra is a corporate incubator-cum-nursery, specialized in the bio-economy, agricultural innovation a sustainable, connected territory. ITerra, supported by the Regional authorities, and the urban areas of Greater Compiegne and Greater Beauvais, aims at accompanying incubator projects from creation and up to maturity.

"Physically, this incubator is shared between two locations: UTC-Compiegne and UniLaSalle-Beauvais. Both sites will be able to provide their scientific and technological expertise", details Pascal Alberti, Director of Innovation and Territorial Development, UTC.

Tell us some more about ITerra? As Pascal Alberti sees it, the objective is to firstly identify innovative projects in bio-economics, digitization and agricultural machinery, then to accompany them through their incubation phase, anchoring them in the territories concerned an in fine transformation into economically viable activities in a given market-place. Il must be noted that the Oise territorial Department already benefits from a very important local eco-system. We may cite, on one hand, notably in academic excellence (UniLaSalle, UTC, ESCOM, ITII), SAS PIVERT (BIOGIS Centre), Agrilab, Pima@tech, the UTC Daniel Thomas Innovation Center, a rich industrial and agricultural landscape and regional R&D establishments (public and private laboratories and technology-intensive).

What domains are to be privileged? "Take the bio-economy, for example. Admittedly, the domain is quite vast. As we see things was to observe the economic environment and our biotic ecosystem in order to seek best valorisation, in the field of economic activities, and bio-resources available in our territories transforming them into products or services for a the market-places. In concrete terms, we can notably imagine transforming bio-resources into products destined to the agro-food industry or in new molecules for the luxury perfume sector", explains Pascal Alberti, adding to conclude "We could also envisage applying digital tools and biotechnologies".

Who underpins the projects?

"Projects may be initiated at UTC and /or UniLaSalle who train students for engineering and Master's degree? But it is not a closed structure. Projects can also come from other players, provided they are in line with both the defined scientific fields and the expectations of the territories themselves", underlines Pascal Alberti. There are some 15 projects being assessed at this point in time. Is there a long-term objective? "Well yes, it is to build up a portfolio of 20 projects in hand continuously. This implies that when and as one or several projects mature and leave the system, the same number of new projects are taken on board", he asserts. ■ **MSD**

INTERNATIONAL

UTC front-stage at the CES Las Vegas

Du 8 au 11 janvier, **Las Vegas accueillait le CES, rendez-vous incontournable pour toutes les start-up** et entreprises travaillant dans le domaine de l'électronique, du numérique, de la réalité virtuelle... Comme chaque année l'UTC y était bien représentée.

CES is recognized everywhere as the 'premier' technology show in the world, and is essential to start-ups and other business who seek better visibility, and also for the contacts they can make on an international level. The French Hauts-de-France Region took a keen interest in the CES and has accompanied various companies and start-ups since 2017. "We have presented a exhibitors' stand since last year's events", added Karine Margerin. "Our aim is to promote the regional territory, local companies and start-ups, notably those that might attract the eye of major industrial groups".

This year we see Ubikey, a start-up incubated at UTC who have designed and developed an interactive display table to rethink collaborative work, and they were invited on the Region's stand. According to Pascal Alberti, Director of Innovation and Territorial Development at UTC, who accompanied the delegation to Las Vegas this offered a splendid opportunity; "The CES 2019 is an extremely important event in the field of innovation and we were able to benefit from the professionalism of the executive angers and members of the economic partners of the Hauts-de-France Region and Eura Technologies, enabling us to maximise the potential gains of taking part in the CES". ■ **MB**

http://ubikey.fr

* Economic cluster devoted to IT and Communications for the Euro-Metropolis centred on Lille.

OTHER STARTUPS ALSO ATTENDED THIS YEAR'S CES- LV

Jack n' Ferdi created by Anne-Fleur Andrle, a UTC graduate and Romain Aubanel, which is a ''bleisure' app. (neologism combining business and leisure), enabling business travellers to discover what they can do and visit, where and what they can eat between two rendezvous in a new city.
▸ **www.jackandferdi.com**

Havr created by Alexandre Ballet and Simon Laurent, two UTC undergraduates. This start-up has developed a connected door lock which opens when it picks up flashes from a smartphone.
▸ **www.havr.io**

Healsy created by Stephane Bidet, a UTC graduate, a mobile "app", received an award at the CES for its use of artificial intelligence (AI) technology to predict hypo- or hyperglycaemia for diabetes patients.
▸ **www.healsy.fr**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LAURENT TAUPIN

Today's inventors are the engineers

Following a period of 9 years with Engineering Systems International (ESI), one of the key world suppliers of virtual reality software and services, Laurent Taupin was recruited to the Renault Group in 2001. He held several posts with the Group, both in France and internationally. As of July 2016, he has been Executive Engineering Manager for Renault's projected autonomous vehicles. Below, we offer a portrait of this curious, open-minded man.

Curiosity – did you say « curiosity? Laurent Taupin has proved this ever since he was knee-high to a grasshopper. Did he have dreams of becoming an inventor? "When I was very young, my drawings were mainly based on gear-wheels – I found every moving part absolutely fascinating". So what games did he enjoy? "Meccano® and Lego®". Over the years, he gradually became more realistic and chose to study for an engineering degree. "I realized that in real life, today's inventors are engineers", he underlines. He does, however, recognize that his choice of engineering specialty was somewhat hazy. But one thing was sure, as he sees it: "I did no want to become a chemist or a biologist, for example. We needed parts; we needed machines, to make things move". More curiosity? Laurent Taupin shows this inasmuch as in his adolescent years, in the 1980s, he became interested in energy-related issues, in particular. "Renewable energy, wind power, tidal machines …". Does this point to an open mind and a capacity to avoid heavily sign-posted career paths? Indeed, Laurent Taupin refuses the vision and the "straight-jacket of lycée 'prep' classes and the classic grande école route", he notes. He also showed that between two 'grandes écoles' with integrated 'prep' classes: INSA (Lyon) and UTC (Compiegne), he chose the latter, "not hesitating for a second". Why make this choice? "The excellent reputation in technology at UTC which goes uncontested and the impetus originally given by the founder president Guy Deniélou introducing humanities and culture into the curriculum", he explains. That was a period of his young adult ideas which created some marvellous memories for him. "Over my five years training at UTC, I enjoyed an extremely dense, rich and demanding course in a solid science base. But it was also a very human experience where I sort of discovered who I was. To illustrate this – and it was rare in French engineering schools - I learned quite a lot about arabo-muslim culture and neurolinguistics programming, discovered philosophers, took classes in theatre and also got myself largely involved in student associations at UTC", he adds.

This prove an opening that rapidly led to new horizons for Laurent Taupin. As of his 3rd year in mechanical engineering, elective specialty in materials and innovation, he carried out a 6 month internship at Goodyear's Engineering Centre in Luxemburg. And for his 5th year internship, he went to South Korea at a research centre co-founded by the French steel-making company Clecim and Posco, a Korean partner. Indeed that was the country where he first met the now Ms Taupin.

After a year as visiting scholar at Ohio State University, Laurent Taupin was hired by ESI, a world major player in digital modelling, who mandated him to South Korea to develop a newly created subsidiary. Three years later, he as back in the USA, in the American automobile capital, again with ESI in charge of the US market.

He was then, in 2001, approached by Auto Châssis International, an offspring of the Renault Group where he started a new careers stage at its Home Office in Le Mans, as head of its Computer Centre. He then did a detour via Renault Samsung Motors, in South Korea, he was appointed to the Renault Group's Techno Centre, at Guyancourt as a manager and executive engineer for autonomous vehicles, as of July 2016. His job consists of exploring wat is called Level 4 (out of 5) for completely autonomous vehicles, viz., those that do not require drivers. It is an area, recognizes Laurent Taupin, that raises numerous ethical, safety questions, not forgetting identification of responsibilities. … some major challenges the key automobile companies, such as Renault, are actively preparing for … ■ **MSD**

BIO-NOTES

1991 : graduated from UTC in the major Mechanical Engineering, and elective specialty in materials and technological innovation

2001 : joined the Renault Group to head the company's digital chassis modelling unit

2014 : presented EOLAB to international press, a research prototype, fuel consumption 1L/100km

2016 : Executive Engineering Manager for Renault's projected autonomous vehicles

AGENDA

TECHNICAL 'EXPERIMENTAL' DAYS IN ACOUSTICS AND VIBRATIONS (EXACT#3)

20-22 March 2019
UTC's Daniel Thomas Innovation Centre

https://exact3.sciencesconf.org/

FORUM ON SUSTAINABLE ENGINEERING

Thursday March 21, 2019
Pierre Guillaumat 2 Centre at UTC

forumdelingenieriedurable@assos.utc.fr

ENGINEERING SCIENCE OLYMPIADES, C/O AMIENS NATIONAL EDUCATIONAL AUTHORITY

Thursday April 25, 2019
Pierre Guillaumat 2 Centre at UTC

Interactions
interactions.utc.fr

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