

Donnons un sens à l'innovation

# Interactions

## EDITORIAL

### International outlook And innovation policies



This 22nd issue of Interactions is very clearly devoted to exploring a double horizon, that of Innovation as an integral part of our international ambitions and UTC's international development via innovation policies. The Local Ecosystem for Innovation and Creativity (acronym ESLIC), in

which UTC-Compiègne has been one of the flag-bearers for over a year now, can look forward to strategic assistance from an Advisory Board instated end May 2013, dual ambition of which is to assure a strong territorial anchoring of ESLIC in the Picardie Region and also to meet a demand for a future high-level blend of intelligence and culture; "innovating innovation" is indeed the key challenge we face today and will be the central thematic addressed at our Conference in October 29, 2013, an event to celebrate the 40th birthday of UTC-Compiègne. Another limelight theme of this issue is our development in China, with the launching of the 2nd phase of the ETSeuS platform of the University of Shanghai and the establishment on its campus of our joint laboratory ComplexCity, focussing on the concept of sustainable cities. Many observers are envious of our success in China, but this must not obviate the need to engage in in-depth analyses of our international development model, in terms of geographic targets, of marketable products, of economic models, of development tools ... The UTGroup's Standing Committee on Development and Finance (Universities of Technologies), which was created recently decided, moreover, that it should examine these questions and address the issues on the basis of innovative schemes to designed to enhance international development. A truly major challenge lies ahead! Let me also take this opportunity to welcome the new President of our Board of Administration, Mr Thierry MORIN, whose personal international experience and expertise in innovative policies will prove, without any doubt possible, extremely valuable assets to identify innovative paths forward for our University for the next 40 years, in a vastly different context, whether it be economic, social, academic, cultural or political, compared with what we experienced in the 1970s when the UTC-Compiègne adventure began. ■

**Alain Storck**

President and Vice Chancellor UTC-Compiègne

LES  
DOSSIERS

 **China,**  
*a laboratory to envision future  
sustainable cities* Page 5

## 'Late-night' Research at UTC-Compiegne, Edition #3

Thursday June 6, 2013 from 7pm to 10pm, students were able to discover UTC-Compiegne research activities at first hand as it is conducted in the University's laboratories, and to exchange with research scientists and PhD students. This event, Late-night Research, was designed to enable those interested in a research career to consider pursuing their studies to PhD level ... ■



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## Seminar: "Innovation and the Digital World", preparatory to the 40th birthday Conference programme

In the context of the Conference "Innovating innovation" programmed for October 29, 2013 at the Sorbonne, Paris (open to then public at large), students from UTC-Compiegne (student engineers and PhD students), accompanied by a group of research scientists, held a seminar June 10, 2013, to question Dominique Boullier, sociologist, Francesca Musiani, sociologist, Yann Moulier Boutang, economist et Bernard Stiegler, philosopher. Over 70 persons attended the seminar and were delighted by the enthusiastic debates that took place among the speakers and with the audience. ■

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## UTC's Costech Laboratory celebrates its 20th birthday

The event will be celebrated June 28, 2013. A "science café", open to all, end morning, will address the theme "Augmented Man: discussions on post-human utopia", with Jean-Michel BESNIER (University of Paris 4), Elsa DORLIN (University of Paris 8), Yann MOULIER-BOUTANG (UTC-Compiegne) et Bernard STIEGLER (UTC-Compiegne). ■

## THINK TANK



# Compiegne's local innovation and creativity eco-system is 'cleared for launch'

The eco-system is one of the major ambitions UTC Compiegne: to be at the heart of a system that enhances innovation and creativity in the Compiegne city and environment. The inaugural meeting of the Advisory Board was held May 29, 2013; the role of the Board is to advise, to guide and otherwise encourage this flag-ship project.

This Board counts some twenty members, all strong 'believers' in the new partnership, getting readied for launch – starting with Ronan STEPHAN, former President and Vice-Chancellor of UTC Compiegne and today Director of Innovation, with Alstom group. He offered a brilliant demonstration of how necessary it is to have the mediation of "those that know" when it comes to rethinking any innovation policy. "Faced with stiff international competition, intellectual property law rights are not enough to protecting companies today. We must now move rapidly and build strategic partnerships with the academic world, not forgetting to consult 'civvy street' to test various uses of any given, proposed solution before it is deployed and developed. In essence, an eco-system can provide relevant answers to these challenges, and it can create the conditions propitious for comprehending and answering the demands of the future – and this, believe me, is no easy task!"

## 'Open innovation' versus intellectual property rights

Ronan STEPHAN knows what he is talking about: at Alstom, there is a Group Innovation Committee and a specific, in-house, social network used to build "bridges" between scientists, the R&D division and customers. "We shall also be using mediation of academic actors to create discussion, research and experimental forums. The risk if we don't proceed in this manner is that we might miss out on some breakthrough discoveries; hence it is essential to build and maintain long term relationships with research laboratories, with the experts in both science and technologies". Ronan STEPHAN spoke of several cases in point that had rapidly become vital for Alstom, among which big data mining and management. "A contract was signed

with UTC Compiegne in connection with operating systems, to work with data bases and data packet transmission that was becoming both denser and denser and more and more stratified. Today, what we have to admit is that it is the speed with which a company can get its products to the market-place that counts in terms of competitiveness, far more indeed than any intellectual property rights. In China, for example, our network solutions have been largely copied and there was nothing we could do about it. The local ecosystem for innovation should seek to strike a balance among the logic followed by the various actors in the field, in a context of mutual trust and co-operation around joint projects. Mediation between enterprise and Society at large necessarily transits via the scientists and engineers 'who know'. This function is primordial."

## Long term, flexibility and pragmatism

UTC Compiegne is perfectly happy to fulfil this function: in France, UTC is the first French University to launch such an ambitious territorial project. It will not be a new formal entity, but rather a mechanism that brings together the economic, academic and public actors. "A viable ecosystem must be able to rely on local strong points. In the Netherlands, the equivalent project is carried by the Philips Corporation, in Switzerland by EPFL (the Ecole Polytechnique Fédérale de Lausanne) who has organised it



Ronan Stephan, Director of Innovation, Alstom Group



on the engineering school campus. In the case of UTC Compiègne", notes President Alain STORCK, "the most important point was to build up a regional ecosystem and to share governance with the partner enterprises and local authorities. UTC-Compiègne is just one cog in the wheel, the overall richness of which lies in the degree of collaboration and the enthusiasm of all concerned". This diagnosis of the situation is shared by René ANGER, Executive Director at the Picardie Regional Council. "Ever since the 1980s, the Picardie Region has been setting its priority R&D policies and thematics



**Ronan STEPHAN** (Director Innovation Alstom Group), **Prof. Alain STORCK** (Pres. & VP UTC-Compiègne), **Prof. em. Allen SCOTT** (UCLA, USA), **René ANGER** (Executive Director, Picardie Regional Council)

as a function of industrial crises and urgencies; There is an almost natural convergence between the 4-year Contract between the Government and the Picardie region and UTC's objectives, notably in regard to new forms of mobility and plant chemistry which we support and encourage via the company called Capital-risqué Picardie Investissement (Picardie venture capital investment). The Picardie Region has always played an incentive role – the question is, can we (and how precisely) push matters even further? Certain ancillary tools, certain operational schemes are now outdated and need to be revitalised if we want to induce a new spirit into regional innovation. Let me add that we shall not succeed here if we do not first achieve a convergence of interests and aims between the Region's public authorities, its academics and industrialists. The ecosystem we are discussing must be part of a long term strategy, both flexible and pragmatic as we implement it. It definitely must not be reserved for "the happy few" – which leads us to a vital question: how will the ecosystem cover and irrigate the Region?"

## "Culture seen as an integrating factor"

How indeed can we best organise the eco-network to bring, for example, the techno-park called Rives de l'Oise closer to, or in contact with, Méaulte and its predominant aeronautical activities? How are we to mobilise scientists and artists round joint projects? As Véronique MISSERI sees it, there are 4 major axes to be privileged. Valérie is a UTC research scientist and lecturer, who has accepted the mission to pilot this project to success. The first axis concerns the UTC Innovation Centre. Student-engineers, enterprise representatives, research scientists will be able to meet and exchange in this 5 000 m<sup>2</sup> building currently under construction; it has been designed to encourage and enhance innovation intensive initiatives and intellectual brainstorming on all floors, so to speak. Cultural activities will also have a key role to play, in order to make the Centre open up to the public at large. "Culture is an integrating factor", underlines President STORCK. UTC Compiègne is already building bridges between arts and technology, a good example being the Composite(s) Festival which

brings together visual artists, manual workers and digital proponents. One of the first projects of the UTC Innovation Centre relates to a sector where art and high technology go hand in hand: luxury brand flacons. There are UTC teams working on innovations projects for the benefit of the 65 SMEs of Glass Valley (a world class pole for luxury brand bottling in the Bresles valley (they are studying anti-counterfeit marking, thermal properties of the flacons, etc.). Innovation and gains in competitiveness of these small companies should help ensure that their know-how and expertise in glass stays in France. The local ecosystem for innovation will contribute to making other initiatives more visible. A good example is the event: SME Ambitions (SME-student-engineer encounters), or the 24h Innovation Challenge (see p. 17), in which activities UTC would like to associate the regional enterprises desirous to do so.

## The coming digital community

"The 2nd priority thematic will be to develop an innovating, digitally meshed community, with inter-connecting social networks" explains Valérie MISSERI. "Some 80 are already connected to the network we have been operating now for 4 months; the 3rd and 4th axes will be to issue invitations to innovate and create develop regional scale network meshing, building bridges and cross-overs and locations that are conducive to innovation-intensive activities". About 50 enterprises are now partners to the ecosystem. Some structuring regional entities have also been approached for contributions, among which the Region's industrial poles of competitiveness and i-Trans. "These poles will gradually induce positive effects throughout the Region. The existence of i-Trans and the partnerships we have signed with the major Picardie sites in the field of transportation technologies and engineering have helped enhance - I am personally convinced - the retaining of sites and reinforcement of their activities and in our Region", underlines René ANGER. This provides an encouraging outlook for the ecosystem per se, the objective of which is to create wealth, added value and innovations in many shapes and forms. President STORCK reminds his colleagues that "it is not enough to build premises; we must also give meaning to our endeavour". This indeed is the challenge of 6 priority actions defined thus far: specific research programmes, offer to accompany partners and provide services for start-ups and regionally based enterprises, which constitute meaningful targets for the UTC Innovation Centre, creation of a 'living lab' and a defining of a regional marketing strategy.

## A European ambition

"If we can succeed in enhancing the attractiveness of our Region, then the ecosystem will naturally serve to bring in new enterprises, engineering school outposts and research establishments to set up shop here" stresses President STORCK. "Even if the ecosystem is anchored in Picardie, its ambition must be international in scope. This is one of the corner stones of our overall strategy – to see the University of Technology of Compiègne (UTC-Compiègne become a European University of Technology (EUT)". The new ambition would embody 6 thematics: plant chemistry, mobility/transportation, the environment and sustainable city concept, health, design and entrepreneurship." Professor Thomas FROELICHER, Dean and Director General of HEC Liege, Belgium also is convinced that UTC Compiègne

will assume its full influence and meaning in a European context; he is also a member of the steering committee for Creative Wallonia, a framework programme that places creativity at the heart of a Wallonia development strategy. Wallonia indeed was elected 'European Creative District' in January 2013 for its fine and noteworthy support of a creative economy. "There would, I feel, be a strong geographic and strategic coherency were we to envision building a large area running from Picardie to Wallonia with innovation as the centre-piece of future development schemes", he suggests. To move forward on the European front, 'rendez-vous', as we say, at the Innovation Summit 2013 which will take place in Liege, Belgium, mid-November 2013.

## Indicators, the 'one-stop' shop and mediation

The first meeting of the Advisory Board did not choose to ignore the difficulties that lie ahead. The ecosystem – carried as it is by actors with differing logics and time-scales – must attempt to conciliate their various expectations. "This is the very reason for having an advisory board!" explains Alain STORCK. Two members of the Board, Gilles ZUBERHULER (CEO of Clariant and President of UIC Picardie Champagne-Ardenne) and Hugues ARNAUD-MAYER (chairman of the Innovation Standing Committee at the MEDEF (the French employers' union)), reasserted their commitment to the project. "The Picardie Region is ranked 4th in France in the chemical sector, with 100 enterprises and more than 12 000 salaried employees. Clariant is a partner to both IAR and PIVERT actions. In the framework of the ecosystem", proposes Gilles ZUBERHULER, "it is important to consider vertical integration, whereby chemists can be involved in research activities in varying sites and we can provide space for this in our industrial platforms to accommodate innovating start-ups. What we need here is an open dialogue in relation to intellectual property rights where the academic milieu can play the role of mediator." As Hugues ARANAUD-MAYER sees the future, the UTC ecosystem, at some stage, will need quantity indicators. "We shall need to prove the added value and return on investment (ROI) to the region. This is the only way we can attract innovation financiers, and integrate ecosystem work upstream. When all is said and done, could prove attractive to new local investors". Guillaume LUCAS (Vice-President for the Monitoring Committee for i-Trans and Executive Director General with Faively) sees the ecosystem as a source of opportunities for innovation and creativity and for better co-ordination with local entrepreneurs who wish to start innovative projects and approach the academics interested. "What we have to set up is a one-stop shop approach to replace and coordinate offers that sometimes are in completion and rarely understood. The role of the ecosystem is not yet fully clear on this score, but I shall personally see to it that the ecosystem is not just a new addition bolted on to existing structures". With these provisos and nuances on the table, Stephan RONAN concludes, adding the final touch "We have all the trump cards in our hands: we really must succeed!" ■



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APPOINTMENT

# Thierry Morin, Chairman of the Board of Administration, UTC



Holding a sintered high speed train (TGV) brake pad in his hands, Thierry MORIN enthusiastically described the company he has just acquired, Sintertech, with its 450 personnel, producing parts for both rolling stock and automobiles. As a former Valeo CEO, Thierry MORIN reminisces about his first car, quipping that it was “more push than pull” and contending that the future of this sector will depend on new electric motors. Thierry MORIN combines being President of INPI [France’s national institute for industrial property], shareholder of 7 start-up companies and more recently his appointment to preside over the Board of Administration of UTC-Compiègne. His objective in this new academic post is “rather modestly” to offer his understanding of the economic-financial world outside the University.

## Pre-conditions conducive to progress

These inventions result from joint research carried out in the group. As CEO of Valeo, I had ensured that the 10 branches really worked together, in a long term vision. Eighteen months later we had invented the “Stop & Start” process”, notes Thierry MORIN proudly. He can go on for reams describing the invention “Innovation does not just result from giving orders. The only route open to a company executive, to a government, to a university president, is to create and enable those pre-conditions conducive to progress. In the early 1980s, when I visited the head-offices of the Microsoft Corporation, my first surprise was to see their young programmers working on the lawns outside, and the I learned that this ‘field-work’ was conducive to achieving considerable gains in productivity”.

## “Offering my understanding of the economic and financial worlds”

Thierry MORIN is not arriving at UTC with a “ready-made vision”, but is offering his rich business acumen, an exceptional contact address book and his desire to build bridges between the academic and economic-financial worlds, plus an “obsessive” passion for innovation and new technologies. “UTC-Compiègne is in a remarkable pole position in these areas. If I can contribute to preserving the level of excellence this university has and add my personal understanding of the economic world, then I shall be delighted”, says Mr MORIN. He is aware of the financial constraints that shackle universities today, starting with day-to-day budget problems that must be reviewed in terms of the increasing competition among the academic institutions. “Universities must, out of necessity, secure new sources of finance. Personally, I believe immensely in setting up partnerships that bring the academic and the economic worlds closer together. Imagining corporate sponsored chairs does not shock me at all, nor does the thought of carrying out research for private clients, who may in the long run become partners with the university. Renault, for example, would prove an excellent partner for development of future electric batteries”. For Thierry MORIN, the future of automobile transportation lies in

the all-electric car. Indeed, he believes in this as much as he does in the quality and used for sintered steel produced at Sintertech, and that he hopes to use to assemble electric motors. “For the first time in my life, I possess all the shares of a company, given that I was determined to put it back successfully on the rails. I love when things work out, things like beautiful clock mechanisms, or a good motor. I also like to see myself committed to a dynamic vision, combining pleasure and pain, so to speak.” His total aversion to seeing things stagnate and his vision as a captain of industry brought him to focus on recharging processes for batteries. He invested in a French start-up, Nanomakers, who produce silicon carbide nano-powders. How do they work? They reinforce battery anodes and this allows you to recharge a battery is just a few seconds, with wearing them out prematurely. Thierry MORIN has had so many ideas that some are still tucked away under the drawing board. A good example is his project for a taxi like those in London, but equipped with electric motors. “In fact, I stopped short of showing this to investors, but I’d happily give this project to anyone really interested!”

## Faith in youth

The President of INPI believes in our younger generations. “We must create a maximum number of companies while students study, i.e., when these young people have high levels of desire, appetite and large, potential capacity to invent. Self-blocking mechanisms come as our experience builds up. I have the honour of sitting on the Boards of 7 start-ups, the founders of which are all in their under 30s, but they have tons of extraordinary ideas. My job is to prevent them from making management mistakes; I provide potential contacts, ways to think and act professionally ...” explains Thierry MORIN. With his own Master’s degree in Management from University of Paris-Dauphine in his pocket, he still lectures there: “to give back some of what I myself gained. My experience may well prove of interest to the students. In addition, might I add that we really should strongly invite our senior citizens to help the young, as a kind of civil service ... I myself, I believe in our younger generations and I am delighted to be able to have this new experience at UTC-Compiègne”. ■

“The Cassandras of this world tell us that automobiles are our #1 public enemies: they kill and pollute ... We must ensure that they are not right. Yet, over the past decade, the public is convinced that diesel engines are far from clean. The time is therefore ripe for electric motor drives, but we don’t have satisfactory solutions here,” feels Thierry MORIN just before remarking that VALEO was the first equipment manufacturer to invent the Stop & Start car auto-ignition system and likewise the electromagnetic combustion chamber valve.





# China,

## a laboratory to envision future sustainable cities

Just one figure will give readers a feel for China today: in year 2012, more Chinese lived in cities than in the countryside. After 3 decades of economic growth and rural population depletion, statistics count over 690 M city inhabitants, compared with 656 M in rural areas and townships. It is the fastest urban growth rate ever recorded in human history.

**P**rofessor Joseph Eugene STIGLITZ, Nobel Memorial Prize in Economic Sciences (2001), singled out two major events that will shape, as he sees it, the 21st century: development of American hi-tech industries and Chinese urban development. Chinese cities are continuously growing, 'absorbing' the rural village people who come to the city looking for unskilled jobs in what is sometimes described as the world's factory. Thus, 900 000 villages disappeared between 2000 and 2010, according to the French Embassy services in Beijing and the level of urbanisation will doubtless be in excess of 70% by 2030. Things are changing very rapidly, as it often is often in China. Elsewhere, urbanisation 'took its time'. It took the British 120 years, the French 100 years to reach China's level of urbanization today. The Chinese have achieved their growth in just 22 years!

### Could mobility become the black-spot of the sustainable city concept?

Behind the figures above, we have a country that is radically changing its life-style. Luc MOREAUX a UTC graduate lived for 11 years in China, mainly in Shanghai. He witnessed the introduction of private cars\*, at the turn of the century, viz., when the Chinese Government authorised purchasing by credit. "In a matter of one month the whole population, it seemed, was on the roads! The city rapidly went from cam to chaos. In the Development Zone of Tianjin, location of the TI Automotive production unit where I personally participated in the launch stages, the local authorities very quickly were forced to install traffic lights

everywhere! Pedestrian habits suddenly changed – they were no longer welcome on the roads". Urban pollution rose, even if the cars purchased by the Chinese were mostly new vehicles. China lends weight to the expression "mass production" and the car sector in China is still flourishing. What strikes everyone is the amount of traffic-

jams that occur. "Despite a real effort to develop public transport, notably the Metro, the market explosion of demand for private cars simply was not foreseen", notes Luc MOREAUX, who points for example the underdimensioned streets and avenues, in regard to current and probable future traffic. In Beijing, all the roads and tunnels that allow you to cross the city's ring-road are totally and systematically jammed at peak hours. "The situation is catastrophic. In Shanghai, traffic is a shade more fluid. The city authorities took drastic measures to limit the number of cars on the roads. Car number plates are rationed, and their unit cost can reach 10 000 euros! In Beijing they are subject to a lottery. Some buyers get round the rules by buying a vehicle in some neighbouring area, but in this case they are only allow to drive during peak hours; I myself left China in 2012 because I felt I was nearing saturation with giant cities, so far away from Nature. From the city of Shanghai, I had to drive for 3 hours before I could get to the nearest bamboo forests – which, by the way, are magnificent!"

### Rationed electricity and water

Before returning to France, Luc MOREAUX worked for 3 years in the aluminium sector, Aliplat. "The Chinese Government is gradually increasing its pressure on the enterprises in terms of environmental compliance, notably in regard to pollutants and energy consumption. In 2010, for example, electricity was largely rationed, leading to a 25% drop in our production turnover. Pursuing this trend, China will be able to present acceptable results at the Cancun Climate Change Conference ..." And, if a given factory site does not comply with permitted rationing quotas, they have to tread carefully! The local authorities can remotely create an outage of the electric power supply via a GSM device attached directly to the factory's transformer station. This indeed happened to one of Luc's neighbours, who was duly "punished" for several weeks! Similarly to electricity, water consumption is a source of concern to the Chinese authorities and water occasionally has to be rationed. Regarding waste disposal, most of this ends up in more or less official dumping areas. "A lot remains to be done. But, for both economic and environmental reasons, China must develop more efficient industrial processes – the authorities are progressing in

this direction. This also opens a huge market prospect with openings and opportunities that could prove attractive to our engineering companies specialists in process optimisation. The Chinese in this respect are very pragmatic. When they go into a given market, they immediately want "the very best". Luc MOREAUX would now like to offer his skills and experience to a French company that desires to develop internationally. "Having worked in several countries now, in Europe and in Asia, I think I have the know-how and the cultural acumen to be able to address the question of setting up a subsidiary or to build partnerships outside France. After 11 years in Asia, and mostly in China, I am still amazed at the degree to which the Chinese Central Political Bureau controls the country. The Central Government is very proactive and has all the means it needs to act accordingly. China knows full well that it must pay attention to the environment. To have created a research laboratory on the urban environment seemed a highly appropriate move." Luc is referring here to Complexcity, a joint laboratory created with the University of Shanghai as the local partner, working on "data and sciences" appertaining to the concept of sustainable cities.

### The sustainable city concept as a project

To accommodate expected urban explosion, China has concocted a plan called « "Smart Cities". According to the China Daily (see below), no less than 154 cities have launched calls to tender in keeping with the smart city philosophy, which potentially makes China the largest smart city market on Earth, estimated to be worth 159 billion US\$ by yr 2015! Non-Chinese companies have the opportunity to join this promising market, with a double proviso: 1° that they identify the right local partners and 2° that they get to understand Chinese cities per se. This is what the Complexcity research laboratory is working. In this dossier, we present details of the project as well as of two ongoing research projects. ■

In China, the proportion of urban dwellers will exceed 70% by 2030

The market for smart cities is estimated at 159 billion US\$ up to 2015

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[www.chinadaily.com.cn/bizchina/China-smart-city.htm](http://www.chinadaily.com.cn/bizchina/China-smart-city.htm)

# Complexcity

## planning new cities for the 21<sup>st</sup> century

As this issue of Interactions goes to press, some thirty research scientists from the three French Universities of Technology (UTs) are present in Shanghai, presenting 10 research projects to their Chinese counterparts and to business concerns interested in questions of smart and sustainable cities. The framework for this is the ComplexCity Laboratory. Benoit BECKERS, head of the UTC research teams, Fabien PFAENDER, research scientist for the ComplexCity programme tell Interactions more about their programme, a platform to design and plan cities for the 21<sup>st</sup> century.



**T**here can be no doubt here: cities for the 21<sup>st</sup> century will be both sustainable and smart. The question is, what does that entail? ComplexCity is a joint effort of the three French UTs and the University of Shanghai who share common interests in this matter and who are already coming up with some early answers to the issues addressed.

### Building urban science

Taking the city's urban context as the field for a study of environmental, energy-saving and societal challenges in China today, ComplexCity aims at developing multidisciplinary research that brings together social sciences and 'hard' classic science, reinforcing Franco-Chinese relationships in terms of research and innovation. In the long term, the objective is to build an urban science that can help understand and explain how a building functions, or a street, a district, a whole city and to create innovative services to meet the needs of the business companies and the city's authorities. "To take one example", says Fabien PFAENDER, "the air-conditioning units in cars lead to increased street temperatures in town. With traffic figures, weather forecasts and some thermodynamic data, the increase in temperature expected can be calculated in advance. If we cross-match these data with those on Sina Weibo (the Chinese micro-blog network) it is possible to detect what foot passengers say about the situation and how they react. If they choose to avoid a given street, the sales activities of the merchants on the street will suffer! The town authorities could in this case intervene and order, for example, a road traffic diversion".

### A triple priority scientific programme covering five sectors

Just how is ComplexCity organised? Firstly, the idea was launched in 2011 by François PECCOUD (former UTC-Compiègne President 1995-2005). From June to November 2012 a team of about 20 research scientists from the three French UTs, coordinated by Bruno BACHIMONT detailed and drafted the methodological axes according to the various skills and special competences of the UT laboratories, to the scientific challenges and possible future applications. Three priorities were defined: data gathering and display tools; a critical analysis for social sciences and humanities and the interpretation thereof; data modelling. These three priorities cover 5 sectors with possible applications: 'geron'-technologies, modelling of urban energy flows, urban maintenance urban metabolism and, last sector that of risks factors, urban system vulnerability and resilience. The scientific contents were drafted by Benoit BECKERS and presented to the Chinese partners in November 2012. They were fully approved by the Chinese at that date. "In short, ComplexCity is a blend of two concepts: smart cities and sustainable cities. Our counterparts in Shanghai are more attached to the concept of "smart" cities", a term first coined by IBM and now an integral part of Anglo-Saxon culture". According to this concept, tomorrow's cities will develop using networking principles and Internet. "Our UTC Urban Systems Engineering department looks more at

questions of sustainability", adds Benoit BECKERS. "The scientific programme for ComplexCity combines both, complementary, points of view." The work-load framework was also greatly appreciated by the partners. "It served to convince the heads of staff at the University of Shanghai to work with us. The dynamic joint policy we initiated in 2012 is highly encouraging", says Bruno BACHIMONT. "We were the pioneers of long-term scientific research programmes between France and China", underscores Fabien PFAENDER. Now that the general framework has been defined, we have to launch precise projects, registered and approved in principle by our Chinese partners.

### The trump cards of ComplexCity

The Shanghai mission (June 19-23) of the UT research team aims at "Presenting a dozen detailed projects to our Chinese counterparts, selected for their maturity, their interest for all the partners to the Programme and in terms of financial funding opportunities. The cover the following thematics: smart hospitals, and analysis of street scenes, building maintenance, gerontechnologies, urban metabolism management, etc. These projects have been readied by the French parties. "It now remains to see which projects can be handled by the laboratories and research teams in Shanghai, adds Bruno BACHIMONT. "Both sectors of gerontechnologies and urban maintenance should prove promising. Our ambition is to launch jointly one of two flag-bearing projects by end 2013."

To achieve this, the UT team must be in a position to address questions of cultural differences that can arise in the way scientists work in Europe compared with China. Bruno BACHIMONT adds, in this respect that "The way research is structured in China is much more mono-thematic and mono-disciplinary than we would see in French establishments, which are more open to the industrial world environment. We, for example, can quite readily associate social sciences to robotics research, more easily than our Shanghai counterparts can – indeed for the latter, working with IUT Group scientists is in itself a cultural revolution. We must therefore pay attention to our collaboration modes, to understand and integrate their work habits so that we can progress together." The forces available in the ComplexCity programme are numerous: proximity with UTSeuS (Sino-European College of Technology of the University of Shanghai) which can serve to introduce our research scientists to Chinese culture; the dialogue we have instated within the UT Group, based on this joint programme; the

« In short, ComplexCity is a blend of smart and sustainable cities »



very pragmatic approach of the Chinese actors who can bring to bear a high impact and who at the same time have high expectations from the UTs in terms of innovations and long-term visions; our location in Shanghai where every day new districts are rising, etc.

## Shanghai seen as 'living lab', with the world as final ambition

"The city of Shanghai is a 'living laboratory' of all urban problems and issues, from population ageing to energy uses and waste, but these issues are multiplied tenfold compared with what we observe in French cities. Just by its sheer size and speed of change, Shanghai is a very exciting observatory, ripe for experimentations", underscores Bruno BACHIMONT; if the starting point is this city-laboratory of 25M inhabitants, then the ambition of ComplexCity will be to identify methods and models that can thereafter be applied to other major cities round the world. "Many universities, from many countries already have established an annexe in Shanghai. ComplexCity could become a 'prime attractor' for urban questions and issues. It is fairly easy to start an exchange process in such a highly concentrated focal point. We intend to integrate a wide scope of points of view to be innovative ourselves on the main question: the concept of the sustainable city", concludes Fabien PFAENDER.

## A ten-year project dynamics plan

Where innovation is concerned, the objective of ComplexCity will be to establish a 10 year plan for the projects. Benoit BECKJERS is not at all short of immediate ideas, long-term dreams ... "We could maybe equip the streets with sensors for temperature, wind – something we have never been able to do in Europe, except on, scaffolding which makes urban metrology very costly and short-lived. The ideal situation would be to install the sensors directly on the buildings, to help us understand and locate heat lenses for example, or to control the energy use/savings of the buildings." These devices could have undreamed of repercussions. Thanks to a continuous measurement campaign, the research scientists could develop simulations (and associate tools) to help local authorities make the right decisions in terms of future urban development plans.

## Chinese cities heating the Siberian winter scenes

"It would", surmises Benoit, "prove very interesting for IPCC experts (Inter-Governmental Panel on Climate Change) whose reports are considered as highly authoritative in respect to climate trends and changes. "IPCC models use a framework meshed at 200km side, and this does not allow you to identify the effect of cities on global warming. We know that the heat produced by Chinese cities is warming up the Siberian climate, and accelerating the melting of the permafrost layers. The Eastern USA can increase Canadian temperatures by as much as 2°C through heat transfer via the jet-streams. The IPCC experts have identified these mechanisms but they need to have people on the ground, in the cities in question, to explain how an urban, environment can change local weather and climate. In a mid-term or long-term vision, the ComplexCity Programme could be oriented to address this sort of question, all the more so", concludes Benoit BECKERS, "that the urban built-up surface in China will have tripled between 2000 and 2030."

## "Ten years from now, we could have projects that today lie beyond our dreams and imagination"

For Benoit, optimised urban planning, including effects of climatic change, is the only alternate way to correctly price urban space. "In the past, urban planning relied on aesthetics mainly, but today this is no longer the case. The only way to fight over-pricing and privatisation (and subsequently anarchic development of the city) is to propose a plan that optimises both energy and physics". ComplexCity is therefore to be seen as adding a stone to the concept of sustainable cities and this, according to Benoit, really is a key moment in time for the Programme. "The current state of advancement of our research allows us to predict that we shall be seeing some very interesting results in 10 years' time, notably about 'urban physics'. Thanks to 3D modelling, to satellite data, to climate and weather conditions, to the growing awareness of citizens about urban issues, our students will have the tools to take the city concept even further and carry out some projects that today lie beyond our dreams and imagination". ■

## Partners to the ComplexCity Programme



### UTC

**Director of Research : Bruno Bachimont**  
Yann Moulier-Boutang, Frédéric Marin, Jean-Louis Batoz, Virginie Julliard, Pascal Jollivet, Jean-Pierre Caliste, Benoît Beckers

### UTT

**Director of Research : Pascal Royer**  
Nadège Troussier, Pierre Beausery, Pascal Salembier, Haoxun Chen, Gregory Lannou, Eddie Soulier, Jean-Pierre Cahier, Nacima Labadie, Dominique Gaïti, Nicolas Lefebvre, Hichem Snoussi, Farouk Yalaoui

### UTBM

**Director of Research : Christian Coddet**  
Alexandre Caminada, Abdeljalil Abbas-Turki, Marie-Ange Manier, Hervé Manier, Egon Estrosi

### UTSeuS

Fabien Pfaender, Monzen Tzen

## 2013, a year with new impetus for UTSeuS

**MonZen Tzen, appointed Director of UTSeuS (Sino-European College of Technology of the University of Shanghai) in September 2012, sets the heading: pedagogical innovation, contract partnership research based on Franco-Chinese co-operation and enhanced international visibility.**

"What we are a building is a novel, innovating and unique world" recalls MonZen Tzen. UTSeuS today already represents the largest university cooperative agreement between France and China, in terms of both the numbers of graduates (1 200 over a 5 year period) and of its ambitious goals. "Other engineering schools that have installed annexes in China do not offer Chinese students the possibility of being awarded a French diploma, or the possibility our students have of spending 2 and ½ years integrating and learning in depth about the French professional universe."

### Training rare and highly valued profiles

For Chinese students, UTSeuS offers the opportunity to come to grips with French culture, either in the courses given by French lecturers seconded to the University of Shanghai or during their internships in France. "What Chinese students lack is the courage to think for

themselves and propose new ideas. Confronting their experience with French culture opens their eyes and vista, with new horizons. This instils rare profiles that are highly sought by French companies that locate in China", asserts MonZen Tzen.

### A new master's degree for students from all over the world

In the direction France-China, French students spend a semester or a full year in Shanghai. "Since 2012, 2nd year UTC students can follow the 3rd year general courses at UTSeuS. Thirty-five went to UTSeuS in February, notes the Director. "UTSeuS has excellent relationships with French companies in the Shanghai region and will serve as a platform from which to discover Chinese culture at first hand. We want to enhance this exchange programme". UTSeuS is now actively considering creating a new master's degree level course that could receive students from all over the world. "As of the start of the 2013 academic year, we shall matriculate 1/3 total student intake from partner institutions of the French Universities of Technology (UTC-Compiegne, UTBM - Belfort Montbeliard and UTT- Troyes), viz., ETS de Montréal, University of Linköping in Sweden and UAB, Spain" details MonZen Tzen. UTSeuS is to be seen as a hub and focal point for European companies in China, and will also collaborate, in the framework of this master's programme, with a dozen and more multinational groups also located in the Shanghai area.

### ComplexCity, a Franco-Chinese research laboratory

As of now, French and Chinese students can join in research teams in the Complexcity programme. This is a Franco-Chinese research laboratory working on data analysis and handling applied to the

concept of sustainable cities. This laboratory was initiated in 2011 by the then President of UTC Compiegne, François PECCOUD. "The better you get to know your partners, the easier it is to design and organise new research projects together. This is the logic that underpins this double activity, in teaching and in research with the University of Shanghai" recalls Benoit BECKERS, Director of the UTC research team in Urban system engineering that drafted the scientific programme contents for ComplexCity. SOH Yao, a student taking part on ComplexCity activities offers this comment about his experience. "I think my experience in the ComplexCity activities value added to my personal experience; it helped me find a job, to the extent that that I learned to obtain interesting data from Internet sites but above all else, I learned how to work with foreign partners".

### Improving UTSeuS' visibility

UTSeuS still lacks in visibility and this regrettably is its weak point. "We are beginning to make good use of the fact that UTC Compiegne is a partner to the Sorbonne Research and Higher Education Pole in France, in order to improve the UTSeuS image. The very word 'Sorbonne' is an excellent lever for communication and public relations! The aim is to make our College the foremost international university platform in Shanghai, with a diploma and an important research and innovation programme via a research laboratory called ComplexCity." A new building will be erected on the University of Shanghai University campus to accommodate UTSeuS students. ■



## COMPLEXCITY

# DynamiCity : a project that aims at understanding cities

The project known as DynamiCity or, to give its full denomination “Compared digital prints: Paris/Shanghai” has been awarded 600 000€ financial support under the French Government Programme “Investments for the Future”. Fabien PFAENDER and Guilhem FOUETILLOU (Linkfluence, a UTC partner) present the project for readers of Interactions.

**W**hat do people talk about when they are in the Paris' Latin Quarter? What make certain city areas younger, more mainstream, more bourgeois 'bo-bo' than others? “To better understand cities, we can compare and analyse information as is exchanged on social networks, or more fact-intensive sources such as a country's Yellow Pages. The objective in proceeding like this is to identify trends and to characterise the identity of a city area, as seen and ‘lived in’ by its inhabitants”, explains Fabien PFAENDER. DynamiCity is a two-year project the objective of which is to build up a data dictionary about cities, from mobility factors to water and energy consumption. Such data are more or less accessible. “We prioritise collecting the more open data (web sites, social networks, etc.), from the point in time they have been localised. We then approach various actors, such as the RATP (Greater Paris transport consortium) to seek more data to build up the bases. Having done this, we can move on to the next stage, analysing and displaying the formatted data, and finally to propose services that seem appropriate to the situations. The final objective

is to provide an aid to decision in terms of urban design and development, using the desiderata of the inhabitants as the starting point. If a city wishes to attract a certain socio-economic profile, city Councils can ask us for a profile of similar city districts round the world. We are working currently on this approach with Linkfluence and Xerox. Linkfluence looks after data collection and Xerox analyses them”, adds Fabien PFAENDER.

## Sustainable cities seen as consequent to social networking

Linkfluence, set up in 2006 by 4 UTC Compiègne graduates including Guilhem FOUETILLOU, is specialised in collecting and examining social media. For yr.2012, their annual turnover was 2M€ and they now employ about 40 staff. “Our expertise really lies in collecting and especially analysing web exchanges considered relevant by our customers. Our objective in doing so is to create an added value for the customer, to help get to know his clients better, for example. Likewise, for the customer's partners, to learn how best to communicate with them. Linkfluence has always kept a foot in the R&D aspects of their business”, explains Guilhem. The Dynamicity project is considered strategic by Linkfluence; it has enabled this company to broaden its knowledge base and improve its expertise in another example, viz., working on data accessible in the Chinese Internet and social networks. There are understandably numerous differences between a Western web and the Chinese equivalents, and difficult to work on relationships between digital and real worlds in China and its widespread provinces and is one of the more practical applications undertaken by Linkfluence. “In another case, we charted the right bank of the City of Bordeaux – which is the lesser well off part of the city centre. The City Council wanted to learn more about it via digital activities and presence”, explains Guilhem. “Thanks to analyse of social network content, to blogs, to information provided on local Internet site, we discovered an upbeat urban culture, where music, dancing, street art co-exist and prosper – without the City Fathers knowing anything about their existence! The cultural services of Bordeaux then stepped in and approached these right bank districts, building new social links with the local artists”. Designing a sustainable city can be seen as consequent to social networking among the local inhabitants.

## Improving on the City life-style and experience

DynamiCity lies at the cross-roads of digital and real worlds: so we may question, what exactly is the digital image of Paris? Or Shanghai, while we are at it? To what extent are the social networks contributing to these images? Studying the Chinese Web is extraordinary in this respect and totally “fascinating”. Western networks all have their Chinese equivalent: Sina Weibo is a blend of Facebook® and Twitter®; Youtube® becomes Youkou, Facebook becomes Renren. These sites do not have the same structure or the same dynamics as their Western counterparts. “This requires that we adapt our technology, if only to be able to read and understand Mandarin Chinese”, underlines Guilhem FOUETILLOU. Then we must co-analyse data produced by citizens with data from institutional sensors (weather, traffic, etc.) to build a dynamic mapping of the city under investigation. Linkfluence plans to offer its services to companies that set up shop in China, for the purpose of improving their lifestyle there and their Chinese urban experience. “Let's imagine, for instance, that RATP official services are directly connected to the transport users: the RATP staff could then intervene far more rapidly if required”.

## Getting ready for the Chinese market

We do not expect to have any immediate, short-term, economic profits from Dynamicity, but is it nonetheless a project that allows us to carry considerable prospecting work and to become increasingly innovative on larger and larger possible market segments without having to be concerned, as yet, about profitability”, adds Guilhem FOUETILLOU. The key-word is indeed “patience”: in China the market for “social media listening” is the monopoly of a single entity who has exclusive rights in this field with Weibo and most companies are under the constraint of using its services. “The Chinese market, for the moment, is a closed shop, but the country is opening up rapidly and ‘sky's the limit’, so to speak, in terms of inventiveness in China”, stresses Guilhem. “Social media listening” can also be seen as “social media intelligence” and represents a global market estimated today at 2 billion US\$, and this figure is expected to double up in the next 2 to 3 years. France is ahead of the rest of Europe in the field and has a few “billboard names”, one of which is Linkfluence. The world leader is the American, company Radian6. In today's world of “personal branding” and “demonstrative individualism”, as sociologist Dominique CARDON puts it, the media listening market has lots and lots of opportunities ahead. ■





Quentin LOBBE, UTC Compiegne undergraduate :  
a semester in China today

# ComplexCity, opening the way to tomorrow's urbanism



Quentin LOBBE (UTC in computer science) spent his final undergraduate semester (August 2012- January 2013) at UTSeuS. Quentin wanted to familiarise himself with Chinese culture and take part in the ComplexCity research programme.

**“I indeed participated in numerous side-projects at the Lab., both for the pleasure of being there and to learn as much as I could!** We worked a lot on the Chinese equivalent of Internet, bearing in mind one question: how can you make cities smarter on the basis of heterogeneous web-forum discussions?”

## Mobile 'Apps', marketing and censure

As Quentin LOBBE sees it, the Chinese web structure is an imitation of the Western world Internet, in a closed-shop configuration protected by a firewall that prevents the Chinese from accessing most non-Chinese sites. “By way of contrast, however, the Chinese web is far more developed than ours for all sorts of mobile applications or “apps”, as young people call them, and this makes for a very interesting research topic. Many Chinese start up “apps” for fun. They also have a much stronger relationship with brand-names via their net. I have a Chinese friend who dialogues with his favourite brands on his Smartphone”. Censure does exist but the Chinese have found ways round it. “Chinese net users know the lists of forbidden, monitored words which they replace by others and this leads to amusing word-play based on the way they pronounce their ideograms! The central Government in China just cannot quash the democratic appetite as expressed by 500 M Internauts”. During his short stay in China, several ‘affairs’ were in the headlines, such as the denunciation for corrupt practice of senior civil servants that spammed the

social networks, to the point that they were fired. Internet, seen in this context, has become a powerful counter-power in only a few years’ time.

## Multitudes and huge scales

“At UTSeuS, there are only a few courses where the younger Chinese students and the non-Chinese students study together. We meet and exchange in associations and in extra-curricular activities” explains Quentin. About 15 UTC-Compiegne students spent this same semester in Shanghai and about 40 if we include those from UTT-Troyes, UTBM-Belfort Montbeliard, ETS (Montreal) and the University of Linköping (Sweden), compared with the Chinese classes of around 250. Quentin sums up his impressions “The UTSeuS campus is not ‘downtown’ so I found a flat to share in what they call the first belt ring of Shanghai city, just about the same distance from the city centre to the campus site. The sheer scale of this city is unbelievable. You can literally feel the crowds, the gigantic scale of everything there, with a pulsing, dynamic atmosphere, everywhere you go.”

## ‘Moving contrasts’

Quentin was particularly sensitive to the contrasts he observed, of which he found some quite shocking, in this ‘infinite’ city. “Many business districts are spawning at high speed in former more traditional areas of the city, where foreign businessmen and high-rise constructions play tick-tack-toe with ageing, shaky homes. The new buildings are smothering the historic districts and today’s residential zones are moving farther and farther from the city centre. Some of my

Chinese friends, during my stay, took me to see their parents’ homes ... to be torn down soon. Just outside my window, I saw an entire building go up in just 6 months! Every day, Shanghai is on the move, changing constantly but there does not seem to any overarching plan. Only a few ancient districts are being preserved, to stay as cultural heritage of the City of Shanghai”.

## The concept of the sustainable city: eco-construction and participation

If we want to establish sustainable cities in China, Quentin sees two major axes: eco-construction and participation. “The Chinese riggers build their high-rise constructions fast but in fact they do not last. They have a high demand for Western world experience in this respect. Good ‘participation’ would occur if the citizens were to make good use of existing applications and services to send user-experience back up to the decision-level: about roads, wastes, sanitation, etc.” Quentin also profited from his 6 month stay to visit the Middle Empire: Beijing, Xian, Canton travelling in night-trains from another age, admiring magnificent countryside scenes, discovering the ethnic minorities, learning some mandarin Chinese, etc. “As my stay drew to a close, I became quite self-reliant and did not need to use my English. It was, all told, a gripping experience and you can feel the void when you return to France. My advice to all students registered for classes at UTSeuS is to knock on the doors of ComplexCity, where they can discover and explore research themes that will, I’m sure, become the backbone of cities tomorrow”. ■





SIVECO

# Maintenance, the N°1 problem facing China

Maintenance is a highly sensitive issue in China, where the life expectancy for today's buildings is estimated at between 25 and 30 years. The media and the social networks are now pinpointing situations that are occasionally disastrous and largely due to lack of maintenance: work site accidents, fires, escalator and elevator breakdowns, etc. Since 2009, Siveco, n°1 French SME agency working in maintenance consultancy in China, is a partner to UTSeuS. Siveco also participates in the Building Life Management project for Complexcity, coordinated by Yann MOULIER-BOUTANG.

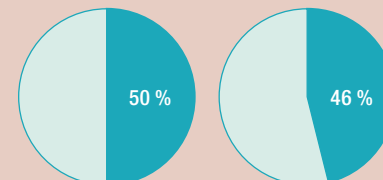
## Increased awareness of the issues at stake

Apart from the much lower life expectancy for Chinese buildings, compared with European standards, these buildings consume two to three times more energy than the Western world average. Final point here, the fire prevention systems are somewhat non-compliant and 10% do not operate at all, according to the Veritas Bureau, a world class conformity and certification company. "For several years now, the Chinese authorities (first property owner in China) themselves provide these figures", explains Bruno Lhopiteau. "In a context of growing awareness, UTSeuS organised a partnership in 2009 with Siveco who have developed an innovative approach that uses mobile technologies as a methodological support for the Chinese technicians. This approach has been successful implemented by some of the major Chinese real estate actors such as the promoter Greenland, a Chinese State company and segment leader". Siveco today has over 70 clients and 700 application sites (Alstom, Carrefour, International Paper, Fushun Mining group, etc.).

## Courses and surveys on maintenance with UTSeuS

Bruno LHOPITEAU has given a course on management of industrial risks in a Chinese environment since 2009. Over the ensuing years, students from UTSeuS have participated in numerous projects with Siveco, including studies as to the risks of the various pavilion building structures presented at the Shanghai Universal Fair, on various waste disposal units and industrial site schemes. Since 2009 and every two years, Siveco and UTSeuS also carry out the "Maintenance in China" survey. It is by far the most comprehensive survey of its kind; the 2012-2013 edition analysed over 1 600 returns from

## A significant margin for progress, both recognised and deemed important



One half of the companies polled estimate that 20% or more of maintenance problems could have been avoided; 46% felt that preventive maintenance could have a positive impact (10% and more) on productivity.

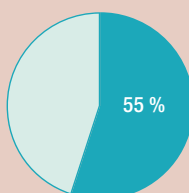
some 834 companies. They demonstrate that there is a growing concern for maintenance questions, a recognised potential also that there is room to improve the situation and a definite willingness by these companies to do so.

## Maintenance: an excellent research topic for Complexcity

"China resembles a huge laboratory where we can develop innovative solutions to their problems", says Bruno LHOPITEAU. He details the possible areas for investigation: a gigantic real property and building sector, with a high growth rate but also a rapid deterioration of the buildings, a lack of industrial maturity, but a very open approach to new technologies; these themes are at the heart of the research programme Complexcity, organised by UTSeuS. Siveco will be participating in one of the more advanced facets of Complexcity, "Building Life Management in China, the Maintenance problem" which is coordinated by Yann MOULIER-BOUTANG. "Maintenance is the N°1 problem facing Chinese industry, public works and urbanism. Here we have a typical question in social

## Very little preventive maintenance

Preventive maintenance represents less than 1/4 of the maintenance activities for some 55% of the persons polled.





science - before being seen as a technical problem – why do the Chinese not consider maintenance as an important thematic? How could we profit from recent cultural evolution to change the situation?” In analysing such questions, Yann MOULIER-BOUTANG is uncovering cultural differences that point to another way of integrating the past.

Impermanence and modern forms of indifference

“Chinese houses are traditionally short-lived, often built with wattle daubed walls. The only important thing to preserve when the Peking ‘hutongs’ and the Shanghai ‘lilong’ houses are razed, is the plaque that commemorates the family. Ancestral experience with natural catastrophes has led the Chinese to adopt a degree of scepticism when anyone entertains “immortal” ambitions for anything they build and Chinese culture today does not attach any importance to the original artefacts or what remains of the past. Which explains, partly, their attitude to copies of art.” says Yann MOULIER-BOUTANG. We can add here a perception of life itself which carries the marks of Buddhism and importance. The changeover from wattle and daub to steel and glass has not modified this vision of life. “What we have here is a form of modern indifference:



Large-scale equipment needs

The companies polled recognise that they are lacking in skills, management and aids to decision tools, in the field of maintenance. 56% do not have adapted computer equipment for this purpose, 3°% are unable to calculate loss of production due to machine assembly breakdowns. Only some 22% actually monitor machine/equipment failures and 30% carry out routine monitoring and analysis.



Planned or possible initiatives

70% of the persons polled state that they will attach a higher level of importance to maintenance questions in the future. 63% envisage taking internal measures to improve maintenance levels, while 52% will engage in external actions (training, advisory studies, etc). 52% also envisage using digital tools to do their diagnosis, and this is a fraction notably higher than in previous years’ editions of the survey.



a building can be destroyed after only twenty years! This is not a problem for the Chinese.” adds Yann MOULIER-BOUTANG. In contradistinction, the current development of tourism to China has led to a far higher focus on preserving the country’s cultural heritage, inasmuch as it is greatly appreciated by visitors from abroad. Tackling maintenance issues appears to be one way to meet the challenges appertaining to the environment and to allocation of resources as needed. “Chinese planners and promoters will be led to incorporating quality criteria in future buildings, if only subsequent to environmental quality considerations”, notes Yann MOULIER-BOUTANG. “But, for the time being, they show no interest at all having professional courses on the subject. We must therefore include cultural criteria ourselves and try to make the most of recent changes in China to circulate our maintenance standards and practice throughout the country”.

A 5 year ‘serious game’, land planning and local governance

“In order to address this problem without having to spend tens of millions of euros on surveys/studies, the BLM project proposes organising a “serious game” lasting 5 years which could, in the long run, be adopted by several million Shanghai inhabitants”, says an ambitious Yann MOULIER-BOUTANG. “The resources for changes in terms of maintenance are to be found in the interactions of a multitude of actors – from private individuals to public & state authorities, and also the industrialists themselves; What we are interested in is to show how social sciences when the appropriate instruments are there and used together with data mining on a large scale can leads to intelligent solutions to a given technical issue.” The game would throw light on the relationships of all the players who take part to quality issues and to the environment, and would also serve to reveal new societal trends. The game will analyse the universe of the City of Shanghai, in both a real and alternately virtual manner, incorporating information that exists today and some data projected for tomorrow – these would be influenced, of course, by ongoing policies and observable trends. For example, future traffic trends can be forecast on the basis of real-estate building programmes. “If the Chinese build large built-up districts at, say, 80km from the city centre, this would lead to horrendous traffic problems at peak hours. Over the past 4 years, we have seen traffic jams increase enormously in Shanghai, says Yann MOULIER-BOIUTANG. “Using the game which, incidentally, is a freeware package, we will be able to identify the variable that the politicians, local city administrators and industrialists will be able to translate in terms of regulations, standards, etc. “The final objective is to improve city governance”. Yann MOULIER-BOUTANG has already brought together a number of Chinese and French partners to the project\*\* and at this point in time, he is busy presenting it to the local teams of the University of Shanghai for the purpose of seeing the collaboration progress further. ■

plus ▶ [tinyurl.com/MaintReportEN](https://tinyurl.com/MaintReportEN)

\*UTC-Compiegne, UTT-Troyes, Ecole des Gobelins, RANDOM – ESDSE, GARAGE – ESADSE, ENSAPM, School of Design Nantes & Shanghai, Centre for Contemporary China Cultural Studies at SHU, Institute of Architecture and Design, Eastern China Normal University.



## INTERVIEW

# “My aim is to see ComplexCity become a world-famous laboratory”

“A strong international thrust is one the 4 key strategic axes of the University of Shanghai . The training and research partnership we signed with the members of the UT Group (French Universities of technology) is in line with this strategy and is in the interests of both parties”, explains LUO Hongjie, President and Vice-Chancellor of the University.

## What does this UTGroup-SHU-UTSeuS training and research partnership represent for your University ?

Given that a strong international thrust is one the 4 key strategic axes of the University of Shanghai, the training and research partnership we signed with the members of the UT Group (French Universities of technology) is in the interests of both parties. The objective of UTSeuS is to make in-depth improvements to our engineering training courses, on the basis of the French model, to widen the international outlook of our students, to reinforce their capacity to innovate, to train those talents we have in a multicultural context whilst mastering international standards and in line with the expectations of China as it endeavours to innovate. In the same light, UTSeuS offers French visiting student engineers the opportunity to learn more about China, its people and culture and to better integrate the Chinese environment. Through exchanges of the younger generations of our two countries, we try to improve on the level of mutual understanding of two major world nations. In terms of research efforts, our Sino-French collaboration satisfies the needs of the City of Shanghai, which will become an international megapole. Our city has its problems (traffic, environment, security, urban planning, resource management, etc.) and needs to learn more from other advanced cities outside China, in terms of their urban philosophy and methodology. ComplexCity will play a very positive role on this question of urban development for Shanghai. The French and Chinese students will be able to make the most of this international, pluridisciplinary platform to participate in the joint research projects and this in turn will most certainly raise the level and quality of our training courses

## What challenges lie ahead, for Chinese cities?

China today has now reached an urbanised proportion of 50%. Of course, many Western world cities have gone through this phase, but in China there are specific features that raise new problems: 1) with the contradiction between frenetic urban development very limited resources, protection of the environment and ecology are becoming urgent matters to deal with; 2) with the contradiction between demographic densification and population ageing, Chinese public services are distributed in an imbalanced manner; 3) with the contradiction between a long term vision of urban planning and a need to meet short term urban functions, lead to increased traffic jams, unnecessary (too rapid) destruction of buildings, floods due to drainage system failures.

## What do you expect to achieve through the first ComplexCity projects?

The notion of “smart cities” must be taken as proposing an alternative way to solve certain urban problems and is no doubt a trend for future urban policy

makers. In the Chinese language, the ideogram for “smart” covers both the technical and the human dimensions. Under the heading “technical”, we have in this particular instance digitisation, automation and intelligence. Under the heading “human”, we have wisdom, humanism and creativity. We are delighted to see that “smart cities” are already among the policy thrusts of Shanghai City and the Town Hall want to develop the city both technically and culturally. Smart City and ComplexCity are addressing the same issues. The University of Shanghai and the French UT Group have respectively carried out studies on the ComplexCity Programme. For a first phase to our research, what we hope is that the joint activities of our collaboration will help raise the theoretical and practical levels of both parties, likewise increase the quality of our student-research assistants and facilitate academic exchanges of qualified scientists. Thereafter, we hope that our results can be valorised and used for technology transfer purposes. If we refer to the Chinese and French laboratories in the field, we shall the try-y to integrate ComplexCity in the Sino-French research cooperation or into EU research and in this way we could achieve a world class laboratory.

## In your view, does this partnership fit in to a political, economic and social context that favours the concept of sustainable cities in China?

The research projects of the SmartCity Institute address issues that relate to ecology, to traffic levels, to public safety and ‘smart’, intelligent construction work ... its assigned objectives are both ambitious and interdependent: human beings have to be valorised, urban dwelling must become more intelligent, resources must be used efficiently, cost and energy savings must be priorities, services offered and quality of life-style must be improved, the darker sides to urbanisation and impact on the environment must be reduced, etc. In short, we must aim at creating real sustainable cities. European cities, as we see them, have lots of experience on these subjects and our partnership will deliver some very useful results to help improve the level of service of our public services and seek an intelligent administration of the country (optimising service systems such as hospitals, traffic conditions, housing, social protection, education, employment and job creation, building platforms and networks to improve public service exchanges, etc.). From an economic point of view, our research will encourage us to review and reform classic, traditional sectors. New emerging needs and parallel arrival of new technologies will doubtless lead to creation of new trade and industrial sectors and will help development of Internet operators and service providers.. ■



plus d'infos ► [webtv.utc.fr/watch\\_video.php?v=22XG5YGUH8KK](http://webtv.utc.fr/watch_video.php?v=22XG5YGUH8KK)



# Sustainable cities

Discussing the concept of “sustainable” cities with Michèle PAPPALARDO is always exciting. She has been, successively, President of the French Agency for the Environment and Energy control (ADEME), French Commissioner General and Interministerial Delegate for Sustainable Development and in the function of Legal Counsellor at the prestigious Cour des Comptes (the National Comptroller’s Office). Moreover, she has recently been appointed Federative Overseer for the “Living better in our cities” programme initiated by Ms Nicole BRICQ, Minister for International Trade, with the remit to organise and coordinate the offer made by French companies in favour of sustainable cities.

## Is there a specific French approach to the sustainable city?

Yes, indeed, I think there is a particularly French approach to the sustainable city. This consists of applying an integrated vision of various urban component constituents, seen as an eco-system and without a need to segment issues such as transportation, waste management, water or power supplies, air, parks, data circulation, etc. My mission today is to demonstrate how ‘French style’ sustainable cities would comply with this global vision, seen as becoming more and more attractive round the world. New solutions arise when we adopt the urban ecosystem approach, and these help maximise overall city performance factors. For example, a given building can embody the ‘best energy saving design’ going, but its global performance rating will still depend on the existence of lean-energy transportation to get there, and get home.

## Smart or sustainable cities ... what intelligence lies in the concept of sustainable cities?

Sustainable cities really become ‘intelligent’ when they incorporate the best available technologies, notably in the field of digitised or numeric data, but with the proviso that they are used not only to meet the needs of the citizens but also to prove lean in energy consumption, efficient in performance and attractive. Performance must not be the target if it runs counter to a certain life style or cultural standards. The risk, obviously, is that the inhabitants will not accept the changes. This in turn implies that we must not simply see technology as a bolt-on process, no matter how advanced these technologies may be, nor should we seek to enforce a single, simplified model to every country. Solutions must be adapted to local contexts, to culture, to history, to the complexity of urban environments; we must seek to understand the city’s inhabitants if we wish to offer buildings, areas, complete cities that they will learn to accept and cherish. France’s cities have this likeable ‘touch’ and their inhabitants are quite happy with their surroundings and facilities: our challenge is to valorise the process!

## Do you think your mission can come up to the expectations of the actors in this field?

France’s major building contractors, our transportation sector, our energy and water utilities are world famous. Our architects, our urban designers and are design offices have extremely high reputations; our SMEs are ‘innovation intensive’. More and more of the actors above are beginning to share the vision of a sustainable city – and this is where the concept must be formalised, to be in a better position to sell it to our customers, viz., the elected officers in the cities and towns and the

local citizens. For instance, if we were to answer a call to tender for a new tramway route, we could propose the carriages and the rails ... and at the same time a positive vision of the consequences in terms of urban improvements. This global vision demands that the industrialists work together to come up with an integrated coherent offer. Each actor here, of course, has specific high level skills, know-how ... and at the same time, he can understand what the other partners are offering too. It proves to be a highly stimulating yet complex way to implement the task, but it is now seen with enthusiasm. The actors, overall, are now aware that there is a need to move forward together. Witness the recent collaboration between COSEI (a strategic committee formed by the eco-industrial sector representatives) and AFEP (French association for private entrepreneurial concerns). There are, however, several obstacles to working in a transverse manner, if only some of the stipulations in the Labour Code. If we want to have show-case examples in France for this integrated global approach, then we must have joint offers made in response to calls to tender for rehabilitation of a city precinct, and this is simply just not possible with current rules and regulations.

## Are there some identifiable markets where you could export the concept of sustainable cities?

In order to avoid spreading my efforts too far, I would like to concentrate on 3 to 4 countries, to test the response to our methodology, to adapt the approach in terms of local contexts, and look for the best consortiums possible. My first two priorities are China and Morocco. In China, the thematic of sustainable cities was addressed during the recent presidential state visit by François Hollande to China, notably on the occasion of a renewed contractual agreement to co-operate on a pilot zone called Greater Wuhan (Hubei Province) with its 12 M inhabitants. There are two factors that make the Middle Empire attractive as a possible market outlet: the Chinese are aware of some mistakes they made in planning some recent cities, built at full speed without any real global vision. Here is a place where we could demonstrate our skills, all the more so that our “urban system” corresponds fairly closely to their dual wish for harmony and balance. In the case of Morocco, certain new sustainable cities have been built there, notably integrating some complex problems in terms of mobility. I would like to see France in a position to associate our national skills to propose efficient urban areas to the Moroccans, thanks to a better integrated approach. The good marker for my mission will be to see the approach ‘exported’ by the industrialists outside the pilot areas on which I want to start. ■

## DID YOU KNOW THIS?

The sustainable city concept is taking shape in France, thanks to the impetus of the Sustainable City Plan and the French Government's Investments for the Future incentive programme. France now has 9 show-case cities (and the list is growing: Greater Bordeaux, Greater Strasbourg, Greater Lyons, Grenoble-Alpes Conurbation, Issy-les-Moulineaux, Lille Conurbation, Marseilles Euroméditerranée, Nice Côte d’Azur Conurbation and Nantes Conurbation)

[www.developpement-durable.gouv.fr/Vitrine-des-villes-durables,31763.html](http://www.developpement-durable.gouv.fr/Vitrine-des-villes-durables,31763.html)

Solutions must be adapted to local contexts, to culture, to history, to the complexity of urban environments

## The digital ranking of France's Grandes Ecoles

UTC-Compiègne confirms its second place position, May 2013 in the digital ranking system of France's Grandes Ecoles, for the 6th month running. UTC-Compiègne also came second in terms of social rank. The creation of the UTGroup (French Universities of Technology) also saw numerous articles published on-line. ■



plus ► The full ranking can be seen at:  
[www.ingenieurs.com/classement-ecoles-ingenieurs-2013.php](http://www.ingenieurs.com/classement-ecoles-ingenieurs-2013.php)

## Three UTC students win the Public's Prize, at the first 'Scrapathon'

Three UTC Compiègne undergraduates studying Computer Science, Noé GAUMONT, Perrine LETELLIER and Quentin LOBBE were the laureates of the Public's Prize at the first Scrapathon (a competition devoted to data mining on Internet) that took place Wednesday June 12, 2013. The event began with an introductory session on 'scaping', followed by live mining by the various teams. Our three undergraduates chose to extract data from minutes of the Paris City Council and then analyse them. At the end of the "marathon", the students had to present files that could run on computers in the format .txt. They now have to conclude their mission by processing the text format files, indexing the data, etc. When they have finished, their results will be publish on Data Publica and on the web-site [www.nosdonnees.fr](http://www.nosdonnees.fr) ■

## DotEmu, a small company tops the billboard in Japan

When he visited Japan, June 7, François Hollande, President of the Republic of France met some CEOs from French innovating start-up companies who are setting up partnerships with their Japanese counterparts and others. A case in point is DotEmu, created by Xavier LIARD and Romain TISSERAND, graduates from UTC Compiègne. DotEmu specialises in 'old' video games, adapting them to modern tactile devices. The company works closely with Japanese game sector companies and had 30% of their annual turnover with Japan for fiscal year 2012. ■

## AN INNOVATIVE PROJECT

# Have businesses found a memory?

Head of the ICI team at the UTC-Heudiasyc Laboratory, Marie-Hélène ABEL initiated and began working on the MEMORAE project 10 years ago – labelled end 2012 by the UTC's Centre for Innovation. MEMORAE is a digital platform that allows all data circulating inside a business concern to be properly managed and handled.

**So, how does one go about collecting all the data that relates to a given topic, addressed from a multitude of angles, by numerous persons?**

This overarching ambition may have its answer in MEMORAE, designed to handle all the data in an enterprise, a university, etc. The information can take the form of a meeting's minutes, or a Word® format document, or be in a tweet or in a chat-room ... all one needs to do is attribute one or several 'notion flags' before it integrates the MEMORAE data knowledge map where it can also have a 'private' or 'shared' status. A utiliser who wishes information of a given subject will use the research engine to identify the subject matter in the knowledge base and to access all the associate resources without having to change the display tool (pdf, Facebook®, Word®, Internet site explorer, etc.). "MEMORAE is a unique platform which grows as successive research projects are used to feed its knowledge base. We are collaborating with the

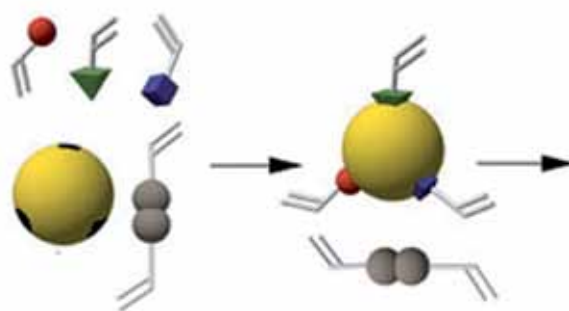
Thales Group on development of the project. Thales has the objective to capitalise on information exchanged in the forum type format (forums, wikis, chat-rooms, etc). The platform will itself act as an in-house social network, where the participants can open and join discussions on any given subject debated or exposed", explains Marie-Hélène ABEL. With Alstom Transport, MEMORAE has been used as a decision-making aid, integrating all the information related to a technical specification. Since September [2012], the [Picardie] regional project CESACO should help rapid and efficient transmission of information among SMEs who use MEMORAE. "Accessing and managing information has become an essential need for all business enterprises, faced with the ever-growing amount of information to hand. A software editing company could transform our project work into a commercial product; indeed, we are expecting results soon from two new projects currently under negotiation". ■

plus ► [www.hds.utc.fr/~mhabel](http://www.hds.utc.fr/~mhabel) • [www.hds.utc.fr/memorae](http://www.hds.utc.fr/memorae)

## RESEARCH

# Bio-sensors top the bill

Karsten HAUPT is delighted and rightly so: the Enzyme and Cell Engineering Unit he heads at UTC has just been singled out in a European call for projects and has been attributed a 600 000€ research grant to cover expenses in a 4-year programme. The project relates to integrated bio-sensors, to be used in agrofood, environmental and biomedical areas.



**“Our project addresses two areas of research in enzyme and cell engineering:** one led by Bérangère BIHAN-AVALLE, entitled, Molecular Diversity et Bio catalysis, and my own, called Functional, biomimetic, nanostructured Materials”, adds Karsten HAUPT. “Both research groups are studying recognition markers that will be used by the bio-sensors, notably molecular print aptamers and polymers”. The probability of being selected in a European call for projects is very low, around 6%. The UTC application was given a 97.4/100 mark by the assessors! “This is the 5th project we have been able to finance by this sort of programme, thanks, I think, to our capacity and succession drafting the application file; Five industrialists joined us: Biosensor and Micronit Microfluidics who are manufacturers,

likewise Sanofi, Suez Environnement and Caiac who are end-product users. The latter named will test our integrated sensors to carry out automated and semi-automatic analyses looking for residual traces of medicinal drugs in milk, and endocrinal active agents in aqueous milieus. Such sensors will also allow us to dose more accurately and monitor certain therapeutic medicinal protocols. In short, we are making labs on chips integrating absolutely novel methods, notably based on use of mimetic antibodies” details Karsten HAUPT. The financing of the project, which will be organised as an integrated [research] training network (ITN) comes under the European Commission's Marie-Curie Programme and therefore carries the proviso that young PhDs be involved in the work. Two doctoral students will be recruited at UTC Compiègne and the unit will be regularly visited by PhD students and Post-Docs sent by the project partner companies who will be able to increase their knowledge and skills in the field. “The project overall also includes organising 3 summer schools, one of which will take place at UTC Compiègne. We are particularly happy with this arrangement” concludes Karsten HAUPT. ■



plus ► [webtv.utc.fr/watch\\_video.php?v=1U3YD6YNXWXN](http://webtv.utc.fr/watch_video.php?v=1U3YD6YNXWXN)



# A 'soft' revolution underway at UTC's Doctoral School

"Ever since 1985, UTC's Doctoral School has experienced several important evolutions that are now being pursued to bring the School up to the very best internal standards", explains Olivier GAPENNE, appointed Director of the School in January 2012. There is, however, a small, 'soft-shoe' revolution under way at the moment, designed to conciliate scientific excellence, professional credence and societal well-being.

The battle order of the day is quality and this will be a standing order for years to come", opines Olivier GAPENNE by way of an introduction. 'Charity begins at home', as the adage has it: Doctoral School staff agreed to conduct an in-house exercise, focused on adaptation and openness (the training programmes, analyses, roles distribution, etc.) the aim being to attain some ambitious objectives. "What we really need is to improve our level of attractiveness, both to recruit PhD candidates from the best universities in France and elsewhere and the best among our own UTC engineers and those with the Master's diploma", stresses Director GAPENNE. At this point in time, only a small number - marginally in excess of 2% of UTC's 700 diploma award graduates per year - actually choose to pursue studies to PhD level.

## Brushing up the image of becoming a PhD candidate

"We must make this situation evolve. It would be terrific, for example, if we could reach, say between 7 and 10%, bearing in mind that at MIT the figure is 20%", says Olivier GAPENNE. "The PhD ratio is one of the factors taken into account for rating comparisons and in current international benchmarking, it is patent that the most efficient establishments show figures in excess of 15%". So how do you brush up the image and the offer? The Doctoral School has implemented a series of measures to boost interest here, and to generate higher awareness as to the missions that doctors have in enterprise, in higher education institutions and research establishments, thereby creating a dynamic community of PhDs. The 'hard sell' approach includes events such as the PhD Forum or Late-night research shows, where those interested can exchange with the professionals and get a clear answer as to benefits of defending a PhD thesis. "We shall continue to be inventive ourselves to improve the offer. One last point here, the RED2 (network of PhD students and young PhDs) is now very active again.

## RED<sup>2</sup> is revamped

Tifeen RAULT, President of RED2, confirms that "after two years of low-key activity, the new class of PhDs has decided to give new impetus to the association and for this purpose three poles have been created: the networking and professional future pole, the events pole and the scientific mediation pole. The first named will help prepare PhD students to enter the entrepreneurial world when they have successfully defended their PhD thesis. For example, in January we held the Doc'Matinales and we're busy preparing a new edition for the start of the next academic year, in a partnership with the 'Rives de l'Oise' Techno-Park. The idea here is to have the students registered in the local innovation ecosystem. The events pole will provide some animation to "life beyond the PhD studies" and the lab isolation and finally the mediation pole proposes that the PhD students share their new knowledge and know-how with others, at events such as the annual Science Fête".



## Preparing the PhD students to face up to professional reality

The UTC Doctoral School and the association RED<sup>2</sup> are also endeavouring to bring the PhD students closer to the entrepreneurial world. This is a national scale challenge. "Contrary to what happens in Anglo-Saxon countries, in German or Japan, where PhDs are immediately recruited into positions with high level responsibilities, French companies that hire PhDs are few and far between. There is an obvious competition with the classic Grande Ecole engineering diploma and the PhD is not a very familiar qualification for corporate manpower managers. This is especially true at SME level where hiring a PhD represents a large financial commitment that carried a degree of risk. Likewise, seen from the PhD's side, enterprise is a largely unknown world. A lot of efforts have been undertaken these past few years to generate mutual confidence between the two worlds", says Olivier GAPENNE. We do, however, see welcome initiatives taken at UTC (the 'Doctoral Days', the 'Research Job Days', the 'Doc'Matinales', etc). In a larger context, it is Olivier GAPENNE's deep desire to see the entire PhD training as part of a less 'scholarly' and more professional culture - from the performance and results assessment system up to and including the relationships between the PhD students and their thesis supervisor and not forgetting the 'manpower social science elements' in the recruitment of candidates for PhD studies. "The first commission was held recently and went fairly well, as I saw it. Our aim is to recruit PhD students on a wider set of criteria than simple scientific excellence. The candidates must be able to prove they are open to the world outside, and that they have connections with what is happening in the world today. This could in the long run be a vital factor for their success. We should not forget that in France, out of 10 000 to 12 000 who defend a thesis every year, only one have a recruited to a research type professional position. It is in the remit of the Doctoral School I direct to prepare the future 'doctors' to face the professional reality. We have also revamped our training scheme and the changes will be introduced as of next academic year". The new scheme calls for the assembly of a professional promotion kit and also that the students work together on the scientific content and research practice alongside their personal research work. These new elements will be assessed through the 3 year PhD training before the thesis is defended. "We hope to be able to pick and enjoy the fruits of these efforts in about two to three years' time", concludes Olivier GAPENNE. ■

### The Citizens' Village People September 5, 2013

To mark the 40th anniversary of the first UTC-Compiegne class, today's undergraduates will be mobilised on various 'worksites' (technical, ecological cultural and social). It was the students themselves who launched this initiative, in a partnership with the City hall Compiegne and with the Compiegne area Agglomeration authorities.  
<http://assos.utc.fr/asso/tuc>

### The 40th UTC Birthday Concert September 7, 2013

To celebrate the 40th anniversary event, a concert will be given Zic Zazou, whose talent lies in transforming objects into musical instruments. The concert will be open to Compiegne students and inhabitants, in the forecourt of the Benjamin Franklin Centre of UTC-Compiegne, rue du Port-aux-Bateaux.

### Conference on 'Innovating Innovation' October 29, 2013

In the framework of the programme to celebrate UTC-Compiegne's 40th birthday, addressing the general public and the business world, a Conference will be organised at the Sorbonne, Oct. 29, 2014 from 7pm to 8:30pm with some world-famous personalities taking part: Albert Fert, physicist and Nobel Prize laureate in Physics 2007, Chris Anderson, journalist and writer, Andy Pratt, professor of Culture, Media and Economics at the King's College, London, Bernard Stiegler, philosopher, member of France's national Digital Council, Yann Moulier Boutang, professor of economics at UTC-Compiegne. The Conference will be reconvened in March 2014 at Compiegne and open to all active members of the Local Ecosystem for Innovation and Creativity (ELIC) to inaugurate the congress venue called Le Tigre.

### Regional conference to launch the InnovENT-E Initiative June 27, 2013

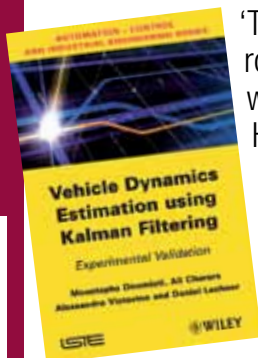
The Picardie Region will host the first "Regional InnovENT-E Conference: answering the challenges facing SME/SMIs to innovate and become international" at the Carré de la République of the Picardie Regional Council authorities' head-offices. The objective assigned to the Conference is to engage in in-depth analyses and exchanges about the conditions needed to improve international stance and help generate innovation for region-based SMEs. Likewise to examine solutions that InnovENT-E can offer. The Conference is open to CEOs and colleagues from the SME/SMIs/ETI.

### First International Workshop of Labex MS2T September 4 – 6, 2013

This Workshop will bring together internationally recognised experts, not only in Systems of Systems but also in Biomechanical engineering sciences, Bioengineering sciences, ICTs, Mechanical engineering and Robotics. The following speakers have confirmed their presence: Terje Aven (University of Stavanger, Norway), Lynne Bilston (University of New South Wales, Australia), Jean-Luc Garnier (Thales Research and Technology, France), Michael Henshaw (Loughborough University, UK), Mo Jamsheidi (University of Texas, San Antonio, USA), Dominique Luzeaux (DGA, French Ministry for Defence), Peter Rutherford (Baxter Healthcare SA), Roman Slowinski (Poznan University of Technology, Poland), Ronan Stephan (Alstom, France), Keith Worden (University of Sheffield, UK).

## PUBLICATION

# A book for *all Heudiasyc partners*



'Take a hard bend in the rain, drive a bit too fast and you will run the risk of leaving the road, which occasionally proves fatal. Could we somehow anticipate this sort of risk and warn the driver in time to avoid the accident?' Prof. Ali CHARARA, Director of the UTC-Heudiasyc Laboratory - co-author of "Vehicle Dynamics Estimation Using Kalman Filtering: Experimental Validation" with colleagues Alessandra CORREA-VICTORINO, Moustapha DOUMIATI and Daniel LECHNER - updates 'Interactions' about progress in this field.

**"If you really want to improve dynamic stability of a vehicle on the road, you must integrate various variables such as road surface**

**adherence, the forces at play, tyre contact parameters with the road-surface, etc.** There are sensors capable of detecting and measuring these factors but they are very expensive, up to 150 000€ per wheel if, for example, we want to measure stress/strain between tyre and road surface; for this reason it is impossible economically to install devices of this sort on cars, independently of the desire to do so as expressed by car manufacturers". So how can we, queries Prof CHARARA, pursuing his introductory remarks, overcome this brake to road safety. The UTC-Heudiasyc Laboratory possesses some of these costly bench equipment units, and has installed them in a lab-vehicle. This alone is a special privilege compared with other labs in France. The scientists have developed new sensors, known as logic-sensors which are inexpensive and could replace the expensive models. "We are currently developing automated variable estimations to check the dynamic stability of the vehicle. We can verify the theory using

the vehicle we have equipped. Of course, experimental validation is essential: so far we have been able to demonstrate that logic sensing provides the same results as the expensive sensors under real road conditions. When you are moving at 130 km/hr, your system definitely has to be able to calculate quickly!" adds Ali CHARARA. The book cited above explains the methodology developed by the Heudiasyc research scientists, sets out development details for estimations of the variables/parameters and how the algorithms were assembled and installed in the test vehicle. The book also gives the results and the validation process itself. "Part of our research work and software use is open source. What we wish to do here is to valorise the devices and logic for the industrialists who read the book and are interested in the method. Our overall aim is to see our software installed in all cars in the future!", explains Alessandro CORREA-VICTORINO, senior lecturer and research scientist with the UTC-Heudiasyc Laboratory. What now remains is to create the interface with the car driver – and that is the work of the car equipment makers and designers. ■

plus d'infos ► [www.hds.utc.fr](http://www.hds.utc.fr)

## FORMATION

# A new and specialised Master's degree for the *Hospital milieu*

For their 5th seminar in 2013, the 8 students enrolled for the Specialist Master's degree in Engineering and Management for Health-related Technologies (IMTS) were received at the Paris Saint-Joseph Hospital complex for 3 days. The topic during their stay was optimisation of surgical operating units.

**"At Saint-Joseph Hospital, 350 operations a week are conducted.**

**A** balance must therefore be struck between optimising: the operations, the use of high technologies and the patient's vital interests", says François LANGEVIN, a UTC research scientist and tenured holder of the Chair of Health Technology Management at EHESP (Public Health Research Establishment). The questions addressed during the seminar are far-reaching: e.g., should an operating unit be profitable? How should we mix new and proven technologies? How should we manage operation scheduling and professional coordination? The UTC-EHESP IMTS course, opened January 1st, 2013, was certified by the overarching Conference des Grandes Ecoles (CGE), organises a seminar a week. "The previous seminars addressed the subjects of brain strokes, representing complexity in healthy systems and charting medical data, engineering and management in health-related organisation and medical imaging", adds François LANGEVIN. And what, we may ask is the aim assigned to the seminars? "The idea is to break down the barriers in the engineering disciplines to better understand and anticipate on technological upheavals as they impact on



health questions and to work on the associated organisation models." For this first IMTS class, 6 students are working in the hospital milieu (they are specialised in information and works) and 2 hold a Master's degree in Biomedicine. They were welcomed to the Reanimation Service by the Service Head himself, and took part in the week schedule building of the week's operations before being led by the surgeon to see the hospital's new technology equipment – including two surgery robots that represent an investment of over 1.5 Meuros per robot. "The Crédit Mutuel Arkéa sponsored the Chair of Health Technology Management", details François LANGEVIN. "The new Master's degree gives the students the knowledge and a good insight into financing and management of hospital structures. The diploma will soon receive its certification in from the French Ministry of Health". ■





## 24 H DE L'INNOVATION

# Are you ready to innovate ? Count-down starting!

You want to find a child in a crowd? You aim to recycle a bomber aircraft as urban, road-side features? You'd like to improve safety for vulnerable people in heavy traffic? In just 24 hours the students teams must come up with solutions to problems set by partner industrialists and laboratories for the "24h Innovation" event where, every year, some 20 student teams from various engineering schools from several countries participate.

The three teams who came top at the UTC selection tried to answer these questions in the form of a 2 min video clip. "Our aim was to form a team to 'have a go' and spend a sleepless night together. Coffee, adrenaline and sheer willpower kept us going – only one fell asleep!" laughs Elza RESZCAN, member of "The Clever Futon Team" who was the laureate of the UTC Compiègne version.

## Localising someone with a wifi bracelet

The Clever Futon Team worked on the crowd problem, which fitted the skills and wishes of the team. "Our knowledge, skills and varied talents turned out to be quite complementary. At first we wanted to wrap up the project in just 3 hours", recalls Jean-Baptiste FOURNIER, another 'CFT' member. "When you think about it, it's a question that interests students who no longer are of an age to get lost in department stores, or on the beach, but they might want to keep track of friends on a night out, for example." The seven team members, all students in Mechanical engineering at UTC imagined a bracelet they called the 'Futeon'. It could be hired out at the entrance to a festival, to an attraction park, to a shopping mall – that way a child or a friend could easily be located. The proposal was detailed: pricing of bracelet and components and developments were advanced (applied to city areas, to

groups, etc). "It turned out to be an excellent experience, but I don't really think we'll develop this idea much further", concludes Jean-Baptiste.

## Turning jet engines into ping-pong tables

For the 3rd time running, UTC Compiègne took part in the international version of "24h Innovation" and it is noteworthy that more and more teams are registering for the event. "It's the sort of competition that suits UTC-Compiègne perfectly; it offers a great opportunity to do team work, to apply course-knowledge, and all specialities can take part", explains Marina BRUNEAU, currently doing her PhD and who organised the local version at Compiègne. And what a success! 65 students in 9 teams competed this year. "I personally wanted to put together a team with a wide set of skills to be able to introduce real and innovative variations in our proposals" says Nicolas GRANJEAN, a student in Mechanical engineering. "We all got very excited, all the more that we had to go beyond our limits – so what happened was that I in fact recruited too many students. That led to two teams; one called CCP looked at how to recycle an aircraft into urban equipment, the objective being to use as many parts as possible in an artistic manner, with special attention to design features without forgetting the technicalities". The jet engines of the Bombardier aircraft were cut in two or in four to become benches, ping pong or picnic tables. The wings were placed on either side of the motorway that marks the entrance to Montreal's Innovation Area. The cockpit

became a sandwich vending kiosk while the hydraulics were recycled to become 'mist-machines' for an open-air pergola, etc. "During those 24h we totally enjoyed the team spirit together. We presented our ideas to the Jury at Montreal and some of them were found of interest by the partner industrialists. And we are keen to register for next year too!"

## Finding local partners

"Next year, the mission assigned to the students organising the event (UV GE37, Project management) will consist of identifying local partners, integrating Picardie Region industrial problem themes and UTC research topics. The student engineers who take part in the 24h Innovation can be approached to pursue their ideas and proposals through to building and developing working solutions" underlines Marina BRUNEAU, who has noted increased quality in the proposals made by the teams to the Jury. "The teams took part of their inspiration from the presentation made by last year's international level winners". The fact is that winning the UTC level version is one way of judging possibilities with world class teams. This year, for instance, contrary to what happened in the 2012 edition, the 'local' event winners did not prove too successful faced with the winners from the other engineering schools. But never mind, UTC Compiègne will be back next time! ■



plus d'infos ► [webtv.utc.fr/watch\\_video.php?v=KHKWS5XDM1R](http://webtv.utc.fr/watch_video.php?v=KHKWS5XDM1R)

## MANAGING INNOVATIVE TECHNOLOGIES

# The 20 years mark for Innovation Management

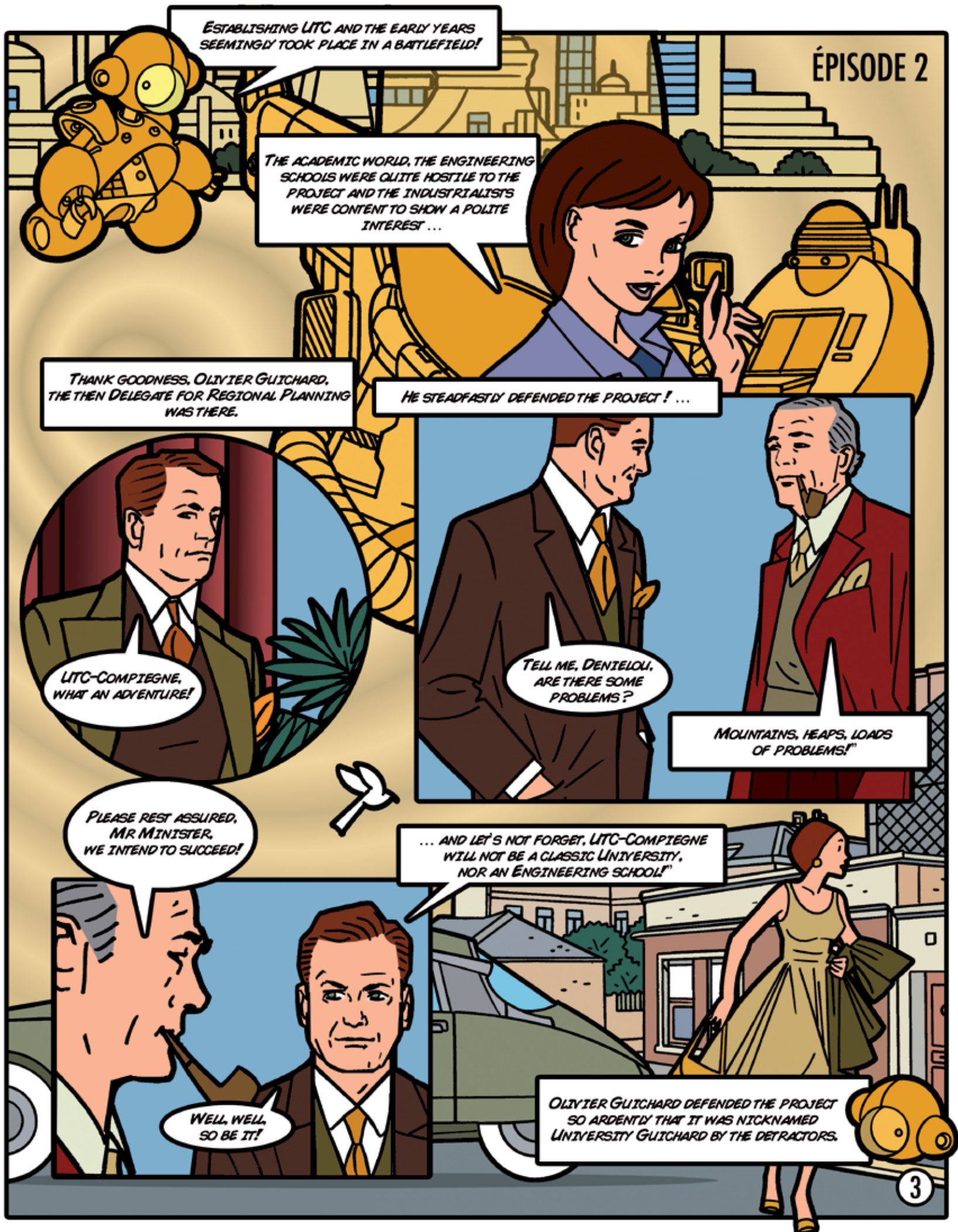
Twenty years ago, François ROMON created the French Master's\* degree "GTI" (managing innovative technologies). Today the GTI Group now numbers around 20 companies on the same theme. They were recently received at the National Academy of technologies of France (NAZTF) to celebrate their 20th birthday.

**"GTI's work is of considerable interest to us" explains Gérard ROUCAIROL, NATF's President.** GTI is a Club for informal exchanges; joining is a process of co-optation. With factory visits, or industrial research units, 4 times per year (Liebherr Aerospace, Areva, etc.), GTI publishes reports and recently recruited the Director for R&D Veolia Environnement. "The two founder members came from the Thomson and Saint-Gobain Groups. They gave lectures in the GTI course, which has since been integrated in the Management of Innovating Projects at UTC, and they wished to pursue their

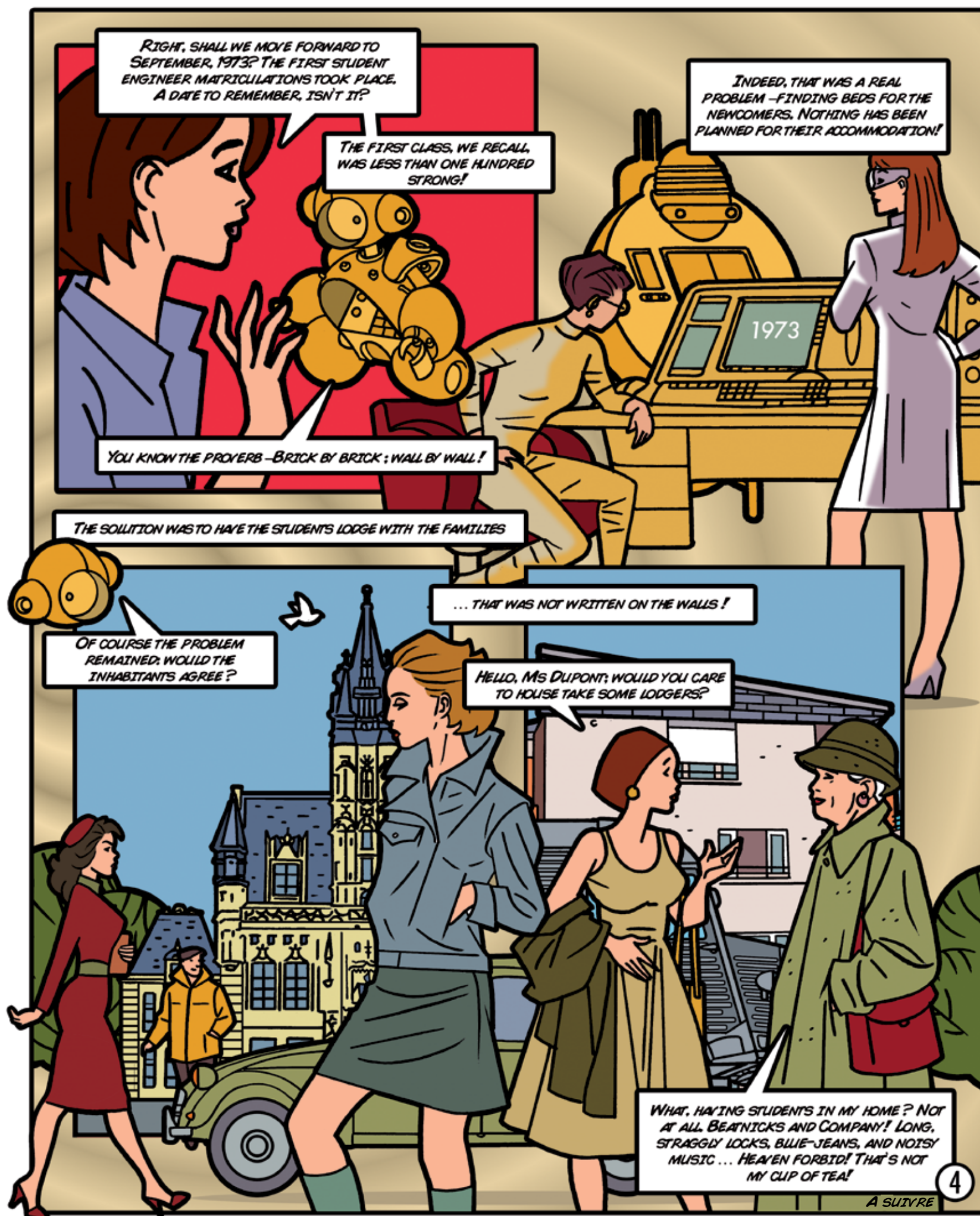
exchanges in an informal setting", explains François ROMON, who is co-ordinator today of the GTI Group, thanks to which he can access data that normally cannot be visited by research scientists, including valuable insights into failure analysis. The visits and workshops lead to written reports, and the non-confidential segments of these are published. "We have done work on a special French R&D tax incentive called CIR (Crédit Impôt recherche), on the statutes and careers for engineers recruited by the engineering sectors – on how to work with the public research sector? And how can scientist-engineer inventors receive some

rewards on their inventions – on how the poles of competitiveness perform – on articulation of research segments in a given company's portfolio of activities. The results of the most recent report were applied to Liebherr Aerospace Toulouse, for example." The National Academy of Technologies of France (NATF) regularly consults academic experts and industrialists to bolster its in-house publications. "From this point of view," adds Gérard ROUCAIROL, "indeed, we enjoy excellent connections with staff at UTC Compiègne. Corporate organisation to foster and enhance innovation remains a great field to explore". ■

To mark its 40th anniversary, UTC-Compiègne tops the billboard : **"Somewhere in the future"**









## Doctor *honoris causa* UTC Prof. Klaus Mosbach, the 'playboy' scientist

Prof. Klaus MOSBACH is a “playboy” and his advice is that we should all copy him! With this touch of humour that belies a great intelligence, our playboy professor, in April, received the distinction of a doctorate honoris causa of UTC Compiègne. His exchange with Interactions goes back over his career and underlines the prime need to keep an open mind.

**In the beginning was the Music.** Klaus MOSBACH plays the piano, has a perfect pitch ear and loves – with the keyboard - to imitate bird-songs, those he used to hear when walking the streets when he was young. Klaus was born in 1932 in Leipzig, Germany and grew up in Lund, Sweden. “I noticed that birds sang in different manners depending on the areas of the city. That was what made me choose zoology as my major at University, because I had this dual passion for birds and music”, recalls Klaus MOSBACH. At one point, he hesitated between biology and becoming a professional pianist. Had this been the case, science would have lost a visionary. Obeying firm instructions from his father, he matriculated for chemistry studies, seen as more “stable” for his professional future; Klaus pursued up to and including a PhD in biochemistry.

### A free-thinker

“There is a huge world-scale promise for biotechnologies. They can change the way we live in many areas, beginning with health sector and green chemistry”, opines Prof. MOSBACH, who really knows what he is talking about. Twenty years ago, when he was “young and handsome” (sic with a smile), the paper he had published in Nature opened up a historic breakthrough. He was the first to demonstrate that molecular print polymers can be used as synthetic antibodies.

The process consists of assembling monomers around a molecule and the extracting the molecule from the monomer envelope. What we have here is a ‘shape memory’: the cavity inside the envelope interacts with any molecule that has the same shape as the original now extracted model. This leads to a form of molecular recognition that can be interesting in much the same manner as synthetic antibodies, i.e., that are more stable than those we create naturally. “My bother and I began this work by isolating proteins using affinity chromatography. We worked with polyacrylamid polymers that my father used to make paints. Then we succeeded in creating envelopes with monomers round the isolated protein molecules and here he had the very base for molecular print polymers. Nobody at the time believed us, but we really had succeeded!”. Klaus MOSBACH then cautiously adds – no

doubt so as to avoid being seen as pretentious, even in the face of the evidence - that “as a free thinker, I am constantly having somewhat weird ideas. Moreover, most of the research scientists doing their PhD or post doc work find themselves in stressful situations when they are writing up or readying papers for publication. They no longer have time to play, when in fact they should stay playboys! What they need is more time to test theories, to experiment extravagant or even a priori unreasonable ideas”.

### Next stop: valorisation

Prof. Klaus MOSBACH has received more than ten major prizes and distinctions throughout his career. He set up the Department of theoretical and applied biochemistry at the University of Lund, Sweden then co-founded the department of Biotechnology at the Ecole Polytechnique de Zurich, Switzerland. The time has not yet come to look back - “What is my best memory? Only the future will reveal that!” – but rather to concentrate on valorising the technology he invented. “Over 100 applications are currently being developed every year. Molecular print polymers can be used to compose new medicinal drugs, or in water treatment, etc. We developed one product specifically to deal with Tamiflu residues that were detected in drinking water after the A-influenza vaccination campaigns. A similar challenge lies in handling residues of pesticide spraying. We are now able to carry out

very accurate anti-doping tests after sports events, using urine samples.” Bioswede, the company he created, holds more than 80 patents but the products proposed are as yet too advanced, ahead of their time. “Let’s just say it is a sleeping company for the time being” regrets professor MOSBACH whose track record and research have inspired laboratories all round the world, including UTC Compiègne. “Professors Karsten HAUPT and Daniel THOMAS, my long-standing friend, are quite fantastic in this field. Karsten’s laboratory for example is really excellent in molecular print technologies”, asserts Klaus MOSBACH, who would love to formalise a relationship between the Sweden’s University of Lund and UTC-Compiègne, by choosing to work jointly on one or two research and innovation projects. ■

### BIO EXPRESS

**2010 – to date**  
Senior Emeritus Professor, Lund University

**1997-2010**  
Emeritus Professor, Lund University, Suède

**1982-1986**  
Professor and Co-founder of the Department of Biotechnology, Federal Institute of Technology, ETH, Zurich, Switzerland,

**1970-1997**  
Professor of Biochemistry, Lund University, Sweden

**1964-1970**  
Associate Professor, Lund University, Sweden

**1960**  
PhD in Biochemistry, Lund University, Sweden



### Interactions

Direction de la publication  
**Alain Storck**  
Rédaction en chef  
**Nadine Luft**  
Rédaction  
**Laure Verhaeghe**  
**Marilyne Berthaud**  
Conception / Réalisation  
**L'agence**  
**Dorothee Tombini-Prot**  
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**Corinne Delair**  
**Véronique Bisiaux**  
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