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Donnons un sens à l'innovation

Interactions

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COVID-19

FROM THE PRESIDENT'S DESK

The Covid-19 crisis has exacerbated a number of weaknesses at all levels of our societies. In order to overcome this crisis, a recovery plan of historic ambition and magnitude - €100 billion - has been announced. Some €30 billion €will be devoted to ecological transition. This is an opportunity to make our cities and territories more sustainable in terms of mobility, soil protection and energy consumption optimisation of buildings. It is also an opportunity to combine the economy, ecology and, more particularly, the fight against global warming by avoiding artificial, sterile opposition.

In 2006, Sir Nicholas Stern, former chief economist of the World Bank, produced a report commissioned by the British Government that caused quite a stir. The report aimed to assess the economic consequences of global warming for the UK and the world by 2100. Up until then, the most sceptical or the most resistant to action against global warming had been pointing out the cost in terms of growth, jobs, etc., and the need to take action. Nicholas Stern pinpointed the cost of inaction: 5 500 billion euros. "If nothing is done, global warming will devastate the world economy to the same extent as the two world wars and the 1929 crisis," warned Sir Nicholas. And he hammers home his point the in this landmark document: “It is global warming that threatens growth, not the other way around”.

This complex era must allow us to invest in ecological transition and in particular in training for the trades and sectors of tomorrow. UTC has many assets to offer in these areas. One illustration lies in the research carried out at the UTC-Avenues laboratory, which is largely based on the environment-sustainable city duo. This interdisciplinary laboratory focusses on multi-scale modelling of urban systems and avails of skills ranging from geography/ geomatics to urban planning and hydrology, from mechanical engineering to civil engineering or electrical engineering, from future mobility to the thermal optimisation of buildings.

These skills can contribute to the emergence of optimal ecological solutions to designing and planning tomorrow’s cities.

Professor Claire Rossi,
Interim Executive Administrator UTC

PORTRAIT

A truly dedicated scientist

Jean Jouzel is a world-renowned paleoclimatologist and from 2002 to 2015 was Vice-Chairman of the Scientific Committee of the Intergovernmental Panel on Climate Change (IPCC). Recipient of numerous scientific awards, he received, in 2002 with Claude Lorius, the CNRS Gold Medal and, in 2012 with Susan Salomon, the Vetlesen Prize, the Earth and Universe Sciences Prize, considered to be the equivalent of the Nobel Prize for these fields. Today, the Covid-19 pandemic and its health, but also economic and social consequences, give him hope that the future recovery will be greener and provide the opportunity to invent a more sustainable development model. Portrait of a man of commitments.

His first commitment is to research. "I graduated from the Ecole de Chimie de Lyon at the age of 21, and “I didn't see myself pursuing a career as an engineer in the business world," he says. So it was only natural that he accepted the subject of his thesis - the study of sulphur isotopes - proposed by Étienne Roth, head of the stable isotopes department at the French Atomic Energy Commission (CEA) at Saclay (Essonne). Incidentally, this enabled him to get closer to his native Brittany.
On his arrival at the CEA - his second commitment, as he had spent his entire research career there - Étienne Roth offered him the opportunity to work on hail formation. Jean Jouzel let himself be convinced, admitting "to have fallen, during his thesis in love with hail, snow and ice".
A passion that would never leave him and which he shared with Claude Lorius. At the beginning of the 1980s, in partnership with the Grenoble glaciology team and the Soviet scientists, they decided to study the ice cores from the Vostok research base in Antarctica. This was to lead to a major discovery a few years later. "In 1987, we had 160 000 years of archives. At the CEA, we analysed the isotopic content of the ice, while our colleagues in Grenobles were interested in the carbon dioxide content of the small air bubbles”.

Young people are the first to be concerned by the issue of climate change....if they are not convinced and mobilised, the question risks disappearing from the radar screens of public authorities.

“In particular, this made it possible to establish the link between greenhouse gases and climate," he explains. This was followed in 1987 by three articles that made the headlines in Nature and marked a turning point in the discipline, but also in the perception of the climate change issues by both the media and the general public.


JEAN JOUZEL ©JulietteAgnel

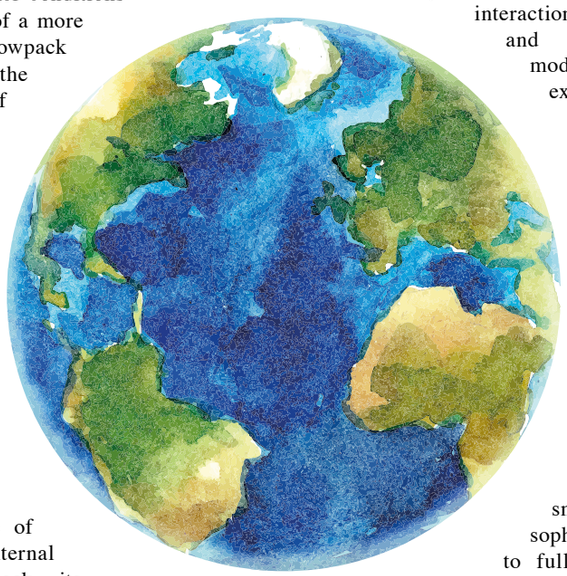
Another major discovery, in 1992, this time in Greenland, was what is known as the "climate surprise", in other words the rapid variation in temperature, which led to an evolution in his research. "We realised that the study of the past climate could provide relevant elements for the analysis of the future climate," emphasises Jean Jouzel, before adding: "We now know, for example, that 125 000 years ago, with a temperature 1 to 2°C higher than today, the sea level rose by 7 to 10 metres" From then on, research and awareness accelerated.
As the first French expert to join the IPCC, in 1993, he has been involved in the drafting of four out of five reports published to date.
His final commitment is his involvement in public debate, particularly with young people in schools, high schools...
“Young people are the first to be concerned by the issue of climate change. Without their mobilisation, the question risks disappearing from radar screens of public authorities", concludes Jean Jouzel. ■ **MSD**

Climatic change: our knowledge and uncertainties

After a long career as a research scientist, Éric Brun-Barrière, since 2014, has been Secretary General of the French National Observatory on the Effects of Global Warming (ONERC) at the Ministry of Ecological Transition. On September 1st, he gave the first inaugural lesson at the UTC of the autumn of 2020.

Graduate from Ecole Polytechnique, Éric Brun-Barrière was very quickly interested in the climate, particularly snow. "A personal passion", he says.

This passion paved his way to Grenobles, to the Centre d'études de la neige, Météo France/CNRS research centre where he studied, in particular, the interactions between weather, climate and the state of the snowpack. "At the time, there was hardly any talk of climate change. What we were interested in was understanding the influence of weather conditions on the formation of a more or less stable snowpack to improve the predictability of avalanche risk", he explains. A passion that has also enabled him to developed, a world first, the the first tool for the numerical simulation of the snow mantle. "It allowed us to describe with a reasonable degree of accuracy the internal state of the snowpack - its temperature, the type of crystals composing each of its layers, its density, etc.,. at a given point in time and thus be able to assess its stability in relation to the risk of avalanches. All this is done using weather data collected from the beginning of the snowpack formation," he says.



A tool that makes it possible to formalise all the knowledge accumulated and which has opened up a new avenue of research for all countries faced with this type of risk. It has also found new application with the rise of the debate on climate change. "The idea is to digitally simulate the state of the snowpack with the hypothesis that, instead of winters as we know them, we would have winters 1.5 to 2°C warmer. What applies to the mountains also applies to the great plains such as can be found in Siberia or Alaska, whose cooling power for the planet is recognised", underlines Éric Brun-Barrière.

After a period at the Centre de Météo France in Toulouse, which he managed for almost 7 years, he resumed research on the interactions between climate and snow. “Climate models are based on extremely complex numerical codes with the component parts - atmosphere, vegetation, sea, snow, etc. This can amount to almost a million lines of code. I have worked in particular on the implementation of snow models that are sophisticated enough to fully understand the feedback and then make more reliable climate simulations. Today, our knowledge is certainly immense, but the uncertainties are still numerous and are subject to intense research to clarify them", he says.

In 2014, he ends his research career and joins the Ministry of Ecological and Solidarity Transition, appointed to ONERC. "I decided to dedicate my knowledge to public policies in the fight against global warming. I have two main missions. The first concerns national policy in regard to adapting to climate change, i.e. i.e. to prepare society for climate change in France at 50 or 100 years from now. The second is to act as an interface between the IPCC and the French government," concludes Éric Brun-Barrière. ■ **MSD**

Climate models are based on extremely complex numerical codes with the component parts - atmosphere, vegetation, sea, snow, etc.

 # *PISE* BY FRÉDÉRIC NADAUD REWARDED Frédéric

Nadaud, who works at the UTC Research Directorate was awarded 1st Prize, a at the photographic competition organized by the conference of electron microscope users, held at INSA Lyon.
The competition was open to all users of Thermo Fisher Scientific scanning electron microscopes. Frédéric entitled his award-winning photograph Pisa. It is a two-photon stereolithography made with a 3D printer. “Ernesto, a doctoral student at the UTC-GEC laboratory, made structures such as towers, stars, etc., to use the machine for the first time and thus determine the resolution in general. Now he wants to 'manufacture' optical elements," explains Frédéric Nadaud. ■

 # COSTECH QUALIFIES AS A CARNOT INSTITUTE
Cognition (of which UTC-Costech is a part) was awarded the Carnot label for 4 years. This qualification label thus enables the laboratory to be part of a long-term project to continue structuring the thematic field of cognition and to accelerate partnership research. ■

 # FRANCE’S HE & RESEARCH MINISTER RIDES UTC’S DRIVERLESSS CAR

Frédérique Vidal, French Minister for HE, Research and Innovation came went to UTC on May 28. During her day here, she visited UTC and more particularly the joint UTC and Renault laboratory, Sivalab. She took advantage of her visit to test the autonomous, driverless car.
“I saw some fantastic things here," the minister enthused. “I am convinced of the essential role of education and research in helping to revive the economy. The automotive sector is going through some very strong turbulence, this platform carries real added-value through its capacity to innovate”. ■

 # UTC’S RANK
UTC ranked 2nd on the Usine Nouvelle podium in the 2020 ranking of the best French engineering schools.
of engineers among post-baccalaureate public schools. Four main criteria are used to establish this ranking: the integration of graduates on the labour market, opening up to the international markets, research and the place of entrepreneurship.
The UTC was also ranked 2nd on the podium in the 2020 ranking of student engineering schools alongside post-baccalaureate public schools (9th overall in terms of score, all schools included, a gain of 4 places compared to 2019). For this ranking, around fifty criteria are used in the methodology, grouped into major categories such as academic excellence, exit salaries and international influence.
Two UTC Masters in the Eduniversal 2020 ranking of the best Masters, MS & MBA. This is the Biomedical Technologies and Health Territories course in the Health Engineering specialisation. It is positioned in 9th place, in the category "Management of health, social and medico-social structures and establishments"; and the User-centred design course in the Humanities and creative industries category, which obtained 4th place, in the category "User experience, UX design".
Finally, the UTC is ranked 364th in the "Engineering & Technology" category in the QS World University Rankings 2020, between 151-200th in the world in the "Engineering & Technology" category.
It was ranked 351-400th in the "Mechanical engineering" category and 351-400th in the "Computer science and information systems" category. This ranking is published annually by Quacquarelli Symonds and is one of the three most reputable university rankings, along with the Times HE Supplement ranking and the Shanghai University ranking. ■ **PS**

ALUMNI

Tremplin UTC becomes UTC Alumni

"UTC Alumni" is the new identity of the UTC “Tremplin” Association created in 1978. This new name ensures better identification and a greater international visibility. At its head - and for the first time - a female president: Claire Behar.

Chaired by Claire Behar since January 2020, UTC Alumni now has more than three thousand members round the world. The association is run with the help of a Board of Directors comprising 23 people, including a data protection officer, Marianne Allanic, and two employees, Céline Keldenich and Julia Vila Llorca. "Its vocation is to federate the community of UTC graduates, to promote the school in the socio-economic world and to provide professional services to everyone. All this in a spirit of conviviality and mutual trust," says Claire Behar, a member of the as Board since 2013. After eleven years working as a volunteer within the UTC community, she becomes vice-president of the UTC Alumni Association in 2014, taking over the presidency in 2020 following Eric Schindler, outgoing president after 5 years in office and current member of the association's board of directors. At the association's home office, Claire Behar can count on the Vice-presidents Jacqueline Forien and Amine Smahi, on, Treasurer Louis Bride and Piers Barrios, UTC Alumni’s Secretary.

Its vocation is to federate the community of UTC graduates, to promote the school in the socio-economic world and to provide professional services to everyone.

Claire herself is a UTC Alumni

Graduating from UTC in 2014, after a semester in Switzerland at the Swiss Federal Institute of Technology in Lausanne and another semester in Shanghai for an internship with the CNRS, she now works for the French company Excelya as head of the Data Science Department, dealing with artificial intelligence subjects in the health sector with her team. With her mandate as president, the young woman is working with the UTC Alumni team to move from a local impact to a global impact. "Our association notably offers ‘webinars’, accessible on different themes, for example: on the feedback of experiences from expatriates, and this is very much appreciated by our members. Several volunteers help us to run the network and we would like to continue to value their contribution to the running of the Association. We are fortunate to have branches in France, such as Lille or Bordeaux, but also abroad, as in Switzerland or the future entity UTC Alumni Morocco." Moreover, the association continues to give a sense of innovation during the health crisis in partnership with Just One Giant Lab (JOGL), an open research and innovation laboratory, as part of the Open Covid-19 initiative.

UTC’s partners and students are all keen customers

UTC Alumni is in contact with a number of companies in many different sectors. The students are looking for such contacts, but beyond that, a helping hand at all times during their time at the school. "At the end of the second interview with UTC Alumni, I had all the data and, above all, all the keys to make the right choices and adopt the right mindset. In the end, the objective set in the coaching contract was largely achieved, as I found a job that suited me completely. It's incredible the feeling that everything is aligned. It's as if all my journey, all my choices were perfectly aligned. It's as if everything is connected and linked to that moment. Thanks to coaching, I gained a better understanding of my psychological functioning, my relationship to work, to others and to money. All the strategies recommended by the association have proved to be very useful. Whether it's to organise my ideas, prioritise my desires or even to read job offers," says Camille, who graduated in 2019 after benefiting from the coaching service. One of the many that this network has to recommend. ■ **KD**

Planning for a sustainable city

Professor Manuela Sechilariu, has been director of the UTC Avenues research unit since 2016. She is also Deputy Director of SEEDS, a CNRS research group (GDR) since 2018 and the initiator and leader until 2018, within SEEDS, of the Micro-networks Working Group (MnWG) at the national level in France.

Created in 2006, the UTC- Avenues Lab - depending on the number of doctoral students and contract researchers - has nearly 25 members. One of its particularities? "It is interdisciplinary team whose skills range from geography/geomatics to planning and hydrology, from mechanical engineering to civil engineering, or electrical engineering". "We focus our research on urban systems and, more specifically, multi-scale modelling of urban systems. That is to say, starting from the building, continuing through the neighbourhood, then the city and finally the surronding territory. The whole being in interaction with the human residents who occupy a central place", explains Manuela Sechilariu.

A particularity that sheds light on Avenue's work, combining engineering sciences with those of the human and social sciences, carried out by the research team. In short, a systemic integration of the various disciplinary approaches whose object of study is the urban system. What is the key objective?

"To study upstream urban systems, considered as complex dynamic systems which form a system of systems given the multitude of subsystems generated. We are mainly interested in the urban dynamics generated by the diversity of the systems involved and the interaction between these systems and human actors", she stresses.

Hence the importance given to multi-scale modelling within Avenues around five themes.

"These themes - micro networks, transport, hydrological risk, digital models or urban planning and policies, for example - are by no means a catalogue of subjects. Our research focuses on the interrelationship of each theme with the others and the precise links between them, both at the level of of a given building, district, town or territory. They also deal with their interaction with contemporary societal tensions, such as the energy transition, the environmental transition, the digital transition and finally the urban transition", she says.

Skills that are recognised at national, European and international level. As proof? The projects underway at the national level. "For example, I could mention Mobel_City, which we won in 2017 following a call for projects financed by ADEME and for which we are the coordinators. It concerns the implementation of smart micro-grids and urban implementation for electric mobility in cities.

What interests us, essentially, are the urban dynamics generated by the diversity of the systems involved and the interaction between these systems and human actors.

A project that illustrates both the skills accumulated within the unit and the interdisciplinarity that reigns there, since it is at the crossroads of the fields of transport - electric mobility, renewable energies, urban planning and sustainable territory. We are supported by an industrial partner, SYSTRA, who specialise in transport issues on a national scale, but also in the Compiègne Agglomeration (ARC)", Manuela Sechilariu explains.

But also international projects such as COST, a European project, and, most recently, the PVPS-T17[1] project initiated by the International Energy Agency (IEA) on the possible contributions of photovoltaic technologies to transport.

"COST, where UTC-Avenues is vice-president through its Chair of Intelligent Mobility and Territorial Dynamics, is a European project that aims to study the impact of future autonomous and connected vehicles on urban and peri-urban mobility. Within the framework of the PVPS programme, we are coordinators, at the national level, of the PV2E_Mobility project, which represents the French contribution to "task 17", while at the international level, we are responsible for "sub-task 2". PV2E_Mobility, a 4-year project funded by ADEME, focuses on the use of photovoltaic energy in transport. This may concern both on-board photovoltaic sources in vehicles and stationary photovoltaic sources for recharging vehicles. Here again, we have industrial partners such as Enedis, Tecsol, SAP Lab, Polymage and the CEA. Subtask 2", which we coordinate, concerns stationary photovoltaic sources for recharging electric vehicles with partners such as China, Japan, South Korea, Australia, the Netherlands, Spain, Austria, Germany, etc." ■ **MSD**

[1] Photovoltaic Power Systems Programme

Aids to decision for a sustainable city

Trained as a geographer, Nathalie Molines lectured at UTC since 2006. She works, within the UTC-Avenues research unit, on issues related to the sustainable city and more particularly on issues of decision support in territorial management.

Geographer by training Nathalie Molines added two strings to her bow during two post-docs: the first at the Faculty of Forestry - Québec on "the contribution of geomatics and cartographic tools in decision support for the concerted management of forest heritage", the second at the Nantes School of Architecture on "The contribution of spatial analysis tools for the co-building of sustainable neighbourhoods". So, what is her interest in the issue of sustainable cities? "This notion comes from the theories of sustainable development put forward in the Brundtland report[1], published in 1987. It states, among other things, that "sustainable development is a mode of development that meets the needs of present generations without compromising the ability of future generations to meet their own needs". A mode of development that is based on three pillars. The economic pillar, the environmental pillar and finally the social pillar. “This applies perfectly to the concept of the sustainable city in the sense that it is a question of finding the right balance between the economic, environmental and social aspects attached to an urban territory. But this balance is difficult to achieve and territorial decision support provides decision-makers with the elements to make informed choices," she explains.

Her main areas of research? "The first concerns the issues of regulatory urban planning and sustainable cities. The second concerns the impacts of climate change and the third, the issues related to the energy transition of the territories. The three are interlinked," she says.

The first concerns the development of models to evaluate, upstream, the effectiveness of a local urban development plan (PLU), a strategic document defining orientations on the evolution cities over the next 10 to 15 years. A research theme that leads, among other things, to practical applications. "For example, in the framework of a Cifre thesis with the Toulouse Urban Area that I supervised at the UTC, we started from three main themes: urban density, amenities or level of services offered on the territory and the aeration of plots. From there, we reviewed the regulations, in short what was authorised or not, in order to see if the project responded to the issues defined upstream by the politicians ", assures Nathalie Molines.

A research axis that also translates into academic partnerships. "I work with the Water and Environment Laboratory of the Gustave-Eiffel University, which is a specialist unit in the hydrological modelling of rainwater. The aim is to combine our two areas of expertise in order to verify the extent to which urban planning documents make it possible to imagine cities capable of limiting the impacts of climate change, in particular rainwater management by facilitating groundwater infiltration and reducing the risk of flooding. A thesis, co-directed by our two laboratories and devoted to urban climate, in particular the limitation of “hot spots” and rainwater infiltration, will be launched next autumn," she points out.

Are there projects on the impacts of climate change?
"A first project with the Water and Environment laboratory focused on the prospective analysis, with a 20/30 year horizon, of how land use in the Lyon region, including urban sprawl, and how climate change might impact the territories. We worked on different scenarios integrating both land use and climate change hypotheses. Very recently, we submitted a project, as part of the State-Region plan contracts, which deals with the impacts of environmental changes on air and water quality as well as on health and biodiversity in the region Hauts-de-France," she explains.

The last axis relates to energy transition of the territories. "Using a spatial approach, I am working both on electric mobility and on the energy efficiency of buildings. If we take, for example, the optimisation of the installation of recharging stations, this presupposes a detailed knowledge of uses and attractor, high density zones. In other words, commercial areas, work areas or even living areas. Another aspect concerns the energy of buildings," concludes Nathalie Molines. ■ **MSD**

Cities, seen as complex systems

Justin Emery, has been lecturing on “spatial planning and urbanism” at UTC since 2019, and concurrently is a research-scientist at UTC-Avenues research unit.

Justin Emery - a geographe by training- sees himself as an “urban quantitative geographer”. His PhD thesis was awarded in 2016 are the University of Bourgogne.
The theme of the PhD? "I developed a simulation model for urban road traffic to better measure automotive air pollution. A model based on data, in particular road counts at given spot," he explains.

Since then, he has been particularly interested in urban geography and the problems of transport and mobility, integrating a quantitative approach. "These are all the methods that make it possible to measure the relationship between human actors and the environment to the urban space in a “normative” way. This requires the use of data. In the case of my thesis, for example, they were derived from road counts. In my current work, I sometimes use surveys; other times I use spatial data. For data analysis, I rely in particular on geo-computation, i.e., the use of digital tools in the representation of space such as geographic information systems (GIS) or multi-agent systems (MAS) or data processing tools," he adds.

His research focuses therefore on the transport/environment duo. "I started with the theoretical frameworks of complex systems via multi-agent simulation. They have also been used, for the last ten years or so, in social sciences, where social systems are analysed as complex systems," explains Justin Emery.

What is meant by a complex system? “By analogy, the city functions de facto like an anthill. If you look at it, you realise that an ant on its own is not significant, but that all the ants together form a complex system, the anthill colony. The city is made up of interacting individuals who move around, who move between different amenities (home and work) and thus form an urban system. It is therefore a question of including the city in its spatial dynamics, which means that the issue of transport and mobility must be taken into account", he stresses.

JUSTIN EMERY

One major axis of his research? "I am trying to deepen the theoretical framework of complex systems for the study and visualisation of spatial dynamics, particularly in the field of transport and road traffic. This framework is fundamentally interdisciplinary, since it is a question of articulating the different scales of the city, running individuals to buildings and infrastructures and up to the city. In short, it is a multi-scalar vision," he says.
A theoretical framework that allows Justin Emery to test practical applications. "Using modelling approaches, it is a question of testing operational capacities and seeing how they can help decision-making on the scale of an urban space. In addition to this, all the approaches of territory surveys are being tested. The aim is to gain a better understanding of transport demand, then how transport functions and finally the factors that influence transport demand, such as the need to travel to work, for example. It is also about better understanding how these factors influence demand, how the territory functions. Especially since we know that a territory functions through mobility and transport. However, there is often a lack of “normative” data. Specific tools must therefore be put in place and ad hoc surveys must be developed to better understand how people move around. These surveys will enable the construction of evaluation tools adapted to transport systems and the movements of inhabitants. We are thus moving from a classic logic of "first we build an infrastructure and then we see if people use it" to a logic of "how to make mobility as fluid as possible and adapt transport to mobility", he says.

It also applies this approach to the city/climate problem. "Having worked with climatologists during my doctorate, I had to use geographical information systems, tools that enabled me to identify the link between urban layout, urban planning and their impact on the environment. This is, for example, the case of the study of the urban heat island (hot-spots), or how urban form impacts heat in the city", he concludes. ■ **MSD**

Electric micro-networks
for optimal energy management

Professor Manuela Sechilariu, has been director of the UTC Avenues research unit since 2016. She is a specialist in one of the flagships themes of the laboratory, viz., electric micro-networks and energy management.

What exactly is a micro-network? "An electric micro-grid is made up of a set of energy sources, both renewable and traditional sources for the local supply of loads, such as buildings or electric vehicles. Thus, concerning renewables, this raises the question of the intermittent nature of this form of energy and therefore its storage and/or connection to the public grid," she explains.

What is the key idea in micro-networks? "It is a question, through micro-grids, of integrating renewable energies as best possible, as quickly as possible and on a massive scale with the help of local regulation in order to relieve the network from its regulation at the national level and to maintain the balance between production and consumption", she emphasises.

How do smart-grids or smart grids work? "Let's take the French national electricity grid, for example. If we superimpose on this network communication means and message transmission that allow us to manage, in real time, the balance between production and consumption, then we can speak of a “smart-grid”. The information exchanged in real time between the producer and the consumer on the one hand and the consumer, who can also be a "conso-actor", i.e., an energy producer, and the producer on the other hand, helps to optimise energy management for network operators of the transmission grid and also at local distribution network level », details Manuela Sechilariu.

What are the objectives of these micro-networks? "Firstly, we seek to optimise the use of the various sources, including storage, and secondly, to be able to supply loads - buildings and vehicles, for example - as efficiently as possible. All this at the lowest possible energy cost. This implies being able to increase the share of renewables consumed while minimising the negative impact on the national grid. These objectives are achieved thanks to algorithms that allow consumption optimisation by taking into account production and consumption forecasts at time t. Algorithms capable of analysing data from the smart grid, data from the various players and finally metadata such as weather data, for example," she says.

Several hurdles still need to be passed. "The first concerns the control of uncertainties that relate to the control of production, for example, since renewable sources are, by nature, dependent on the weather, or those surrounding the level of consumption. The second, technological hurdle, relates to communicating interfaces at various scales, since an intelligent network integrated into a building must necessarily communicate with the public network but also, in the case of an electric vehicle recharging installation, with the drivers in order to optimise the operation of the electric power supply station. Finally, the last point concerns social acceptability. This is a primordial condition to be able to develop services that are subsequently used by users", explains Manuela Sechilariu.

Micro-networks which, as we can see, interact strongly with the theme of mobility, but also with the theme of regulatory relevance and urban policy. "The installation of photovoltaic sources such as micro-grids or storage must therefore be consistent with the planning of a district, a city or a territory. We are dealing with issues that concern buildings and territory with positive energy bills", she specifies.

Some concrete applications? "Let's take the recharging and “discharging” stations for vehicles that offer new services such as "Vehicle to Grid". In particular, this may involve a vehicle connected to its charging station to charge its battery and which, at a given moment decided by the public network operators in agreement with the car owner, will discharge its battery to the network to compensate for a peak in consumption. The energy accumulated in all the electric vehicles in a territory could thus, during a peak, prevent operators from having to resort to starting up a thermal power plant, for example," she concludes. ■ **MSD**

Modelling flood risks

Nassima Voyneau has been a lecturer at UTC since 2005, and is a specialist in hydrological risks at the UTC-Avenues research unit.

What are hydrological risks? "These are all the natural risks related to water. These are, for example, floods, torrential rain, rising water tables or avalanches. I am mainly interested in modelling floods due to rain, rising rivers or rising sea levels. This requires knowledge of the functioning of the water cycle in order to model it, but also knowledge of statistics and probabilities. In fact, as soon as we are interested in the risk, we have to integrate the probability that this risk will or will not occur," she explains.

Her specific research field? "I'm very interested in the urban environment, because that's where the vulnerability of a territory lies. In the past, urban planning was essentially based on aesthetic and functional criteria. Today, we are trying to integrate environmental criteria into urban planning upstream, for example: taking into account the flood risk and the means of "minimising" it," she stresses.

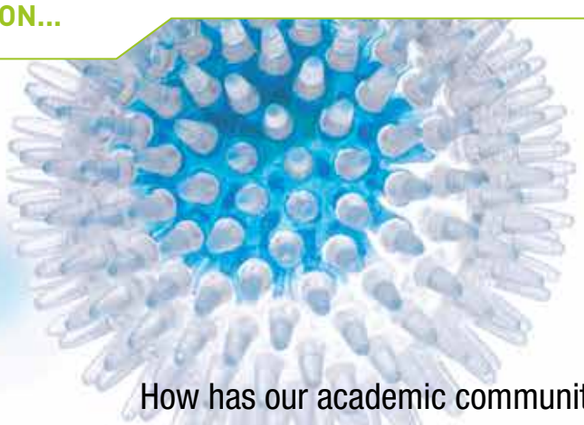
Among the tools used? "Modelling enables a hydrological phenomenon to be understood and simulated using mathematical equations. In the case of flood risks, for example, it is based on historical rainfall and flow rate data. This allows us to create hydro-meteorological scenarios and to see the impact of each scenario on the territory concerned. It also allows us to make long-term projections. Finally, flood modelling enables us to understand how the territory functions in relation to this risk and to build solutions to protect. Thus, if we take a disaster scenario, in hydrometeorological terms, we will be able, among other things, to analyse its impact on the road network or evaluate optimal routes for the delivery of relief supplies... In short, it's a question of preventing the risk in order to better manage it," explains Nassima Voyneau.

An example of recent research work? "A thesis, presented in December 2019, which I co-supervised with Philippe Sergent du Cerema. It deals with the modelling of flood risk in the city of Le Havre. With one particularity: it involved modelling floods generated by the conjunction of two phenomena. Namely the rise in sea level combined with heavy rainfall. The uncertainties linked to climate change have also been taken into account," she explains.

Some concrete projects? "As part of the Sao Polo project, carried out in partnership with other laboratories (CETMEF, EDF, University of Le Havre, etc.), we have worked in particular on the adaptation of coastal cities, including Bordeaux, Le Havre and Saint-Malo, to flooding. The questions at stake are: should this adaptation be carried out by raising the existing dikes or by removing houses from the shore line, for example? Of course, as each city has its own characteristics, the scenarios created are different and the solutions proposed are differentiated. We have also worked on a CIFRE thesis with the RATP, on the modelling of the risk of seeing the Paris Métro network flooded, as happened in 1910. It was necessary to identify the areas impacted, the stations and lines that would need to be to be closed, etc.", she explains. It is clear that the theme of flooding is strongly connected with the theme of urban development. "We know that urbanisation will impact the water cycle by reducing the infiltration capacity of the soil by "bitumising" it. This creates abundant surface runoff and favours flooding. Today, both planners and public authorities prefer to integrate the risk upstream, as early as the design phase of an urban development project, so as to propose developments that do not modify the water cycle. This is known as 'managing rainfall at source'. Thus, we see the appearance of some engineering offices that do not propose solutions to fight against floods but urban developments that integrate infiltration zones. These offer two advantages: they feed the water table while reducing surface runoff, which often causes flooding," she concludes ■ **MSD**

Till now, urban development design has been essentially based on aesthetic and functional criteria. Today, it is important to integrate, upstream, the environmental criterion into urban planning, such as taking into account the flood risks and the means to "minimise" them ».

NASSIMA VOYNEAU



COVID-19

How has our academic community dealt with lock-down measures? From the introduction of online courses to the Fab-Lab making plastic visors, to the involvement of students in first-aid activities; an immersion in campus life in the Covid-19 era.

FABLAB

Plastic visors made at the UTC FabLab

Since February 2014, a small space dedicated to prototyping, laser cutting and 3D printing has been located in the heart of the UTC Daniel Thomas Innovation Centre. Its code name? The FabLab UTC. Every day, dozens of students and teachers use it for study purposes or to engage in personal projects.

With the laser cutting machine, our laser printers or the various tools at their disposal, students can to carry out all the projects they want", explains Justin Darnet, the president of the FabLab association. But on March 12 this year, like all the school buildings, the FabLab closed its doors to comply with the lock-down measures enforced by the Frzench Government. A full halt to the FabLab's activities. Just a few days after the lock-down began, Justin and his team of volunteers decided to resume their prototyping activities. "We were informed of a call from a national citizen network, "Visière solidaire". In concrete terms, this appeal encouraged all owners of 3D printers to use them to make visors for health-care workers and professionals exposed to the coronavirus".

After quick negotiations with UTC's Administration, the team thus recovered the four printers sleeping in the UTC premises and installed them in Justin's garage. In just a few clicks, they downloaded the design plans and start to stock up the raw material needed to make the protective face visors.

The visor support is produced via a 3D printer and traditional plastic material," says Justin. You just slide and fix a plastic sheet over it as protection and that's all there is to it. »

In total, Justin and the other volunteers of the association were able to make several dozen visors. This was enough to provide additional protection for the staff on the front line in managing the crisis. "We're proud to feel that at our level we can help the health-care workers," says the president of the FabLab association. "We really encourage everyone who has the resources at home to participate in this effort. »

But beyond the construction of the visors, the small team has other ambitions. "We have been given guidelines to reserve some of our plastic stocks for other projects related to the health crisis, such as the design of mouthpieces for respirators".

The committed student skilfully juggles between his academic obligations and those he has set himself in the fight against the pandemic. "I devote half my time every day to the production of this personal protective equipment, but honestly I feel useful and I don't see the time going by," concludes the student. Since the start of the new school year, the 3D printers have returned to the UTC FabLab. From now on, they continue to hum within the walls of the UTC Daniel Thomas innovation centre. ■ **GO**

TELL US ABOUT YOUR PROJECT

I was a volunteer worker in the fight against this coronavirus

At the age of 20, Alexis Brossard, a 3rd year student at UTC, will undoubtedly have experienced one of the most original lock-downs of UTC students: employed as a volunteer first-aid worker during the Covid-19 crisis.

Originally, explains Alexis, I was a back-up during various events, mainly the UTC student parties. But at the beginning of March, a few days before the lock-down we received a call to volunteer in the fight against coronavirus. »

The Secourut's association, a federation of French first-aider workers in the Oise region, called in reinforcements from the Samu 60 and the Samu 94.

In the Oise region, three missions are assigned to the volunteer rescuers: telephone reception, organisation of screening tests and management of Covid kits for the health-care front-line workers.

In the Paris region, the ten or so students from UTC were on the front line. "To cope with the epidemic wave, we found ourselves carrying out interventions for the Samu. Ranging from small fractures to Covid cases, we were 5 to 6 volunteers performing interventions in an ambulance," continues Alexis, not without pride.

But the life of a Samu volunteer in the midst of an epidemic is not an easy one. "We slept in a gymnasium and could be called at any time of the day or night for emergency interventions". A frantic rhythm that Alexis finally decided to leave. "In mid-April, I felt that there was less need for volunteers and I took the opportunity to suspend my first aid activities and go back to my studies to complete my semester," confides the young man.

Four years ago, he launched out to the world of emergency. His ambition at the time? To work as a lifeguard in the summer. Today, this commitment has taken a completely different turn.

"It's at times like these that I feel useful to society. I was able to help on a small scale. » If the mechanical engineering student enjoyed the experience, he did not see himself making a career in first aid. "I love engineering too much to stop everything, but I know that Corentin, the president of our association, occasionally desires to study medicine after UTC. »

No doubt, in any case, that the young man will keep a special memory of these 8 weeks of his lock-down work... ■ **GO**

LIFE AT UTC - EPISODE 6

"During lock-down, I rediscovered what boredom meant"

In this new episode, we find Pierre Gibertini, a second year student at UTC, in the middle of France. Between online courses, Netflix sessions and existentialist questions about friendship, this Covid semester has not been an easy one...

It's probably just been one of the strangest semesters of my schooling at UTC...

Like many people, the lock-down measures surprised me, caught me off guard and astonished me. When I learned that UTC was going to close, March 12 in the evening during President Macron's speech to the Nation, I preferred to pack my bags and go back to the Centre of France to my mother's house. I couldn't see myself staying in my flat alone without my roommate. I, of course, or several days, took my precautions, avoiding as best I could any close contacts with my family.

At first I was not very motivated. It was very hard to get used to this new life in lock-down, far from my friends, having to follow online courses. I started to fall behind in some subjects. But, little by little, my motivation came back and I caught up as I went along and as the semester progressed.

I must admit that in terms of pedagogical continuity, we were extremely well supported at UTC. Many of my friends in other engineering schools told me that they had no classes and little contact with their Administration. At UTC, from the beginning of the confinement, we received a lot of information and a distance learning system was put online via the Moodle platform. Concretely, for most of our courses, we had videoconferences for both lectures and seminar classes The lecturers were hyper-reactive to e-mails, and one got the feeling that

everything was set up for a smooth transition. Of course, I missed the physical contact. Whether it was in the lecture halls or just with my friends to work and relax. This lock-down really made me realise that at UTC we don't just work and that life outside the classroom is really important.

What is really funny, however, are the new rules that are being put in place in online courses and seminal classes. We don't often activate our webcams, except for language courses where eye and oral contact is important. If we want to speak up to ask a question, we give a lot of priority to the written word in the lessons, but sometimes, to make it quicker, the teachers ask us to ask the question, live and in person and that can be most stressful.

Another major change this semester is the exams. We had to take everything online, on Moodle, both the mid-term and final exams. But as a result, the grading was adapted. Normally, we are graded with letters ranging from A (best grade) to F (course not validated). This semester, we have only had three grades: A, B or F. If I understood correctly, it's because the online assessment methods cannot be compared to traditional assessments... It's a whole system that is reinventing itself. The 'deconfinement' did me a lot of good. I tended to go around in circles all by myself, spending a lot of my free time watching films and TV series ... which is all right for two minutes, but after two months, it proved a very long time.
With this deconfinement, I was able to start seeing my friends again (taking all the necessary personal safety measures). But in the end, it wasn't as good as I had imagined. As everything is closed, or almost closed, one always ended up bored. We soon got to know what anything and everything we were talking about. But it's always more pleasant, I suppose, to be bored in a group...
I can't wait for the situation to "normalize", if it can be normalised at all. This semester, I'm going back to school. I was hesitating a lot between computer engineering and mechanical engineering, and finally I said to myself that mechanics, and especially the design course, was more in line with what I'm interested in. It remains to be seen if it's the right decision! ■ **GO**

COMMITMENT

UTC 'grads' in the front line facing these crisis times

Students are not the only ones who have committed themselves to this difficult period. Many UTC graduates have rolled up their sleeves to fight the pandemic in their own way. Here are three of their projects.

For Titouan Galopin, a 2018 UTC graduate, commitment rhymes with "digitally". As a computer engineer, Titouan founded with several of his friends the platform "On the front line", to help people exposed to this deadly virus. "On the front line allows all private individuals faced with viruses, whether they are health-care workers, sales people or individuals at risk, to have their children looked after and receive home-delivered shopping", explains the engineer. On the one hand, those exposed or at risk register and detail the services they need. On the other hand, all citizen volunteers can register to respond to specific requests. "We make sure that the people who register are not carriers of the virus, the idea is to guarantee the safety of the various people involved," explains Titouan Galopin. Since the platform was launched, nearly 1 500 volunteer projects have been deployed. This platform, which is so useful in full or partial lock-down should be destroyed by its founders after the peak of the epidemic.

Karima Joly is also a UTC graduate. As a biomedical engineer, she joined the Paris Hospitals in 2018 upon graduation. What was her job before the health crisis? Managing the supply of medical equipment in hospitals. Faced with the crisis, her mission changed scale, upwards. "We found ourselves in a totally new situation where all the hospitals started ordering exactly the same parts," explains the young engineer. We had to find the best solutions to order the equipment our staff needed for intensive care. In the face of the crisis, Karima acknowledges the value of her training at UTC. "During my years of study, I learned how to handle numerous topics simultaneously and to critically analyse all their dimensions (technical, business...) together. "All this knowledge and know-how has been of great help to me during this crisis".

An observation likewise shared by Antoine Lablée, a mechanical engineering graduate and engineer with Decathlon. He has set up a real ecosystem for the creation of individual protective equipment: fabric masks and reusable overalls.
"With my roommates, we had sewing knowledge that we put to use in a vital social project," confides the young man. For him, short-time working in his company was an opportunity to implement a large-scale project to support the nursing staff.
More than ever before, these UTC graduates have held high the motto of their establishment: "Let's lend meaning to innovation". ■ **GO**

ECO-RESPONSIBILITY

From sustainable development to sustainability

How UTC associations are changing

There has been a mini-revolution in the UTC's association landscape in recent months. The term “sustainable development” is no longer popular. "Behind this expression, there is the idea that you have to go through a process of development, of consumption to be sustainable, it does not represent the philosophy that we adopt at the UTC", explains Julie Kociánová, a 3rd year student and sustainability officer in the student union office. So a new term was adopted: sustainability. "Behind this word, there is the idea of sustainability, no longer part of the logic of development, but which must permeate all projects”. Interactions has interviewed the person who seeks to make associations more eco-responsible.

What is your role as UTC Student Office Sustainability Officer?

When I explain what I do to my friends, I compare often that with the role of business consultant. The hundred or so associations of the UTC can ask me at any time to accompany them in their approach towards sustainability. There is a very administrative side to it, with the explanation of standards, the design of dossiers, etc. But my mission also involves a lot of pedagogy and communication. I act as an outside observer who looks at the various projects carried out by the students. I also have a warning role, when I realise that an associative project is not going in the right direction. Often, all it takes is a meeting to put things back on course”.

On what sort of projects have you been working?

I took on this responsibility only a few weeks before UTC was closed in lock-down. As a result, many of the projects I had initiated had to be stopped rather abruptly. But the Officer before me had already progressed on quite a few projects. For example, every year the students organise a cabaret; a big evening where a meal is served and where artistic associations offer performances on stage. During the last cabaret event, the student union (BDE) worked a lot with the organising association to limit as much as possible the plastic waste generated by this event. This is really the spirit of this mission, to provide maximum support. And with the closure of the school, a lot of communications and projects have been dematerialised and computerised, so I try to make the people I meet aware, as much as possible, of good practices for sustainable digital use.

I offer an external viewpoint on the different projects carried out by the students.

What is the programme for UTC’s Sustainability Week ?

This is a week of raising awareness for students on all the themes that are important to us. A team of students is dedicated to this project within the BDE and my role was really to accompany them to make this event as successful as possible. Due to the confinement, this year's edition was totally dematerialised, but it was a great success. We organised online conferences around sustainable themes. Visuals have been published with advice on how to adopt more environmentally responsible practices.

Do you have more incentives to put sustainability into associative projects?

Within the BDE, we have set up a special sustainability grant. In concrete terms, all associations apply for subsidies every year. Well, if they decide - within the framework of their already existing activities, to set up actions specifically oriented towards sustainability - we can support them with some financial aid. It is a real way of giving an impetus.

On a personal level, does this experience as a sustainability manager make you want to become fully involved in this world once you graduate?

I would like to answer “yes” and “no”. It's true that I am passionate about the themes I defend and it is a strong personal commitment that I will continue to make once I have graduated. But what I really like is the consulting approach that I adopt. I have already had the opportunity to do an internship in the world of consulting and I would like to do so once my studies are over. But I still have a few years of reflection ahead of me... ■ **GO**

PLANT BIOLOGY

From plants to bio-packaging,

UTC research scientists are manoeuvring

Adrian Troncoso-Ponce is a specialist in plant biology. He arrived at the UTC in 2017 and conducts research in agro-resources in the area of the Innovation Food Agroresources sector. Work on packaging with students who are increasingly aware of current sustainable development issues.

Adrian Troncoso-Ponce is a lecturer and research scientist in Enzyme and Cellular Engineering (UTC-GEC). He came to UTC in 2017 to take up the Chair of Excellence in the Study and Valorisation of Plant Metabolism, the aim of which is to use plant metabolism to serve industry and economic development.

An expert in plant biology, he soon became very interested in the biology of plastics. "Indeed for me it is a critical subject. The best use of natural resources is a fundamental question for the future. This is called green chemistry. How can we make better use of these resources while at the same time preserving the planet?" asks the Spanish-born researcher, who has since been working with several national and international teams from academic networks including INRA, the University of Nevada in Reno, Macquarie University in Sydney and the Spanish Higher Council for Scientific Research. Adrian's teaching module brings together forty students from UTC. ten hours a week around four themes: bio-economy, bio-energy, bio-materials and bio-polymers.

No lectures, only debate and concrete action

"This course on agro-resources develops an updated, multidisciplinary vision of the valorisation and optimisation of natural resources. It describes various aspects related to the bio-economy and the main biotechnology sectors associated with the profitability of biomass. The course begins with a general description of the current influence of the bio-economy and the circular economy in today's society and continues with the description of specific examples such as the production of bio-plastics and the use of bio-packaging, bio-energy sources and other aspects related to the sustainable use of biomass, in an environment friendly way"

sums up the teacher-researcher, who is in favour of flexible lessons. Indeed, there are no lectures. There is a time for the presentation of the subject and another one just as important for the debate between them on the theme in question with the moderation of the professor. Students must prepare their work from one week to the next on the basis of the elements provided by the lecturer: publications, materials, European documents. "The students are fantastic. At UTC, they are all excellent with whom we switch from French to English or Spanish very easily. They ask questions, have ideas, make relevant criticisms and comments. For me, this is essential. It is essential not to believe everything that is said. I want every student to develop a critical mentality," says Adrian Troncoso-Ponce.

A trendy specialisation

Understanding plant metabolism is a major societal issue today. The UTC with the UPJV Amiens, is, at the heart of the academic research developed on this theme in the region and can rely on the Industries and Agroresources cluster to interact with the socio-economic world. This specialisation represents real growth opportunities for regional players in the years to come and an opportunity to create jobs. The skills developed in biotechnologies in the UTC laboratories, inspired by living organisms, give biological functions an industrial application. "We are part of this sector, which serves the valorisation of agro-resources. But let us be cautious, plants are not the answer to everything", concludes Adrian Troncoso-Ponce. "They will only be part of the solution to replace polluting materials. We mustn't create frustration or fall into science fiction". ■ **KD**

THIBAUT AARON

A new look on the ecological transition you see round the corner

How can we all take actions in a simple way to reduce our ecological impact? Everyone can do small things that make a big difference. One example is the start-up company OOPLA, co-founded by Thibaut Aaron, a native of Amiens, who started his crusade in June 2018. This company specialises in reducing our environmental footprint. OOPLA, for Only One Planet, designs and distributes solutions designed to accelerate the ecological transition by reducing our consumption of resources.

A start-up specialist de la reduction the environmental footprint has been installed for more than a year at Station F, the world's largest start-up campus, in order to accelerate the deployment of its solutions reconciling ecology and economy.

The first solution, offered at the general public price of 25 € including tax and available at suroopla.fr, allows you to reduce your water consumption by limiting the waste of this resource. The water kit already distributed in more than 5 000 copies is designed to be delivered directly to the letterbox, saves up to 50 000 litres of water/year and €280 per year for a two-person household. "With an average water consumption of 150 litres per French person per day and more and more droughts, taking action is becoming a priority," says Thibaut Aaron, one of the six founding partners. OOPLA has launched its crusade

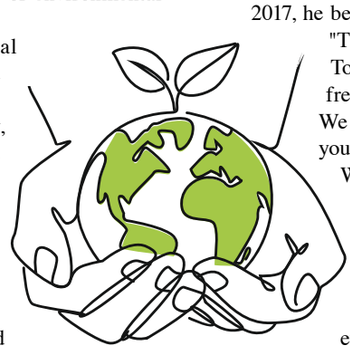
by demonstrating that acting for the planet can be economically profitable. By tackling the waste of resources, the young start-up also offers a laundry kit and ecological boxes on the themes of energy and waste, including the tooth box containing three Moso bamboo toothbrushes and a solid natural toothpaste with menthol crystals, rated 100/100 on Yuka. The aim is to enable everyone to reduce their environmental impact while saving money. In total, more than 11 000 kits have already been sold.

A solidary, social enterprise

Anxious to integrate a social aspect to its activity, OOPLA spontaneously turned to ESAT Les Papillons Blancs, Soissons to assemble its kits. "They are the real heroes! They are particularly conscientious and do a great job," says Thibaut Aaron, who undertakes for each box sold, to plant a tree in a developing country affected by deforestation.

At the age of 29, Thibaut Aaron already has an excellent track record in terms of environmental protection.

A graduate with an M2 in political science, risk management and a master's degree in international and European law, Thibaut Aaron is so motivated by his desire to do something for the planet that he does not hesitate to write to the President of the Republic, to share his convictions.



"I have also contacted the French Ministry of Ecology and I was able to join, in parallel with my studies, the cabinet of the Élysée with two of François Hollande's advisers on environmental and energy issues. My office was very close to Nicolas Hulot's office. My role, notably, was to participate in the interministerial committees, to prepare reports on energy and transport to help in decision-making on issues such as the energy transition law, the law for the recovery of biodiversity and the delicate SNCM dossier. I have to admit that there are a lot of fantasies around this place of power, which for me remains a simple environment where substantive subjects can be dealt with," Thibaut Aaron reveals. At the end of his work-study contract at the Élysée Palace, he joined the Enedis company, at La Défense, in the sustainable development department until November 2016, to prepare COP21. These are two wonderful and enriching experiences that the Amiens region has decided to put to good use in its own adventure.

Around the world of energy transition

Thibaut Aaron is also the founder of Climaction, a volunteer mission to promote energy transition and the circular economy around the world. Indeed, in 2017, he began the Energy Transition Tour.

"The idea of the Energy Transition Tour was to convey positive, guilt-free messages to the population. We are young and all of us fell very young into the digital age.

With the power of social networks we can do more with less. We still expect a lot from the State in terms of the environment, yet it is a very difficult task.

It is the superimposition of everyone's actions on a daily basis that will change the situation. We were able to make on the spot journalism solutions with pedagogical workshops for the youngest, schoolchildren and students and photo and video reports of all the initiatives we discovered in Madagascar, Senegal and the African continent.» ■ **KD**

3 QUESTIONS FOR...

MICHEL DERDEVET,
FORMER SECRETARY GENERAL, MEMBER OF THE ENEDIS BOARD. VICE-PRESIDENT OF THE MAISON DE L'EUROPE, PARIS, LECTURER AT THE INSTITUT D'ÉTUDES POLITIQUES DE PARIS AND PROFESSOR AT THE COLLÈGE D'EUROPE, BRUGES, BELGIUM.

In your opinion, what are the priorities in terms of sustainable development?
Until recently, I would have said limit CO2 emissions and work hard to organise a successful energy transition to adopt carbon-free energy sources. But the health crisis that the planet has been experiencing since the end of 2019 forces us to broaden our field of vision, and to question all past theories of growth, whether they be supply or demand driven. The paradigm of the hegemony of GDP as an index of progress, and of an energy still there to feed it, is falling apart. "Consuming more and living badly, earning more and living less well, that's what productivity is reduced to in order to end up with the absurdity advocated by the capitalist model," André Gorz observed in 2009 in Vers la société libérée (Towards a liberated society). It is clear that tomorrow a certain vision of the planet will have to be rethought, and that other indicators, linked to the very definition of sustainable development, will have to be put in place, based on the well-being of citizens, respect for natural harmony, the provision of essential services and the development of common goods.

How are we to reconcile energy transition and sustainable development?
A paradox, we tend to ignorer, of this year is that in recent days oil has reached historic lows, less than $30 a barrel (-55% since the beginning of 2020), which does not really encourage the previously mentioned movement towards carbon-free energies, at the same time as widespread "quarantines" and the collapse of global coronavirus impacted activity are showing us everywhere in the world less polluted cities and clearer waters. In my view, some of this is just an illusion; we must rebuild the world economy on renewed fundamentals, and not start from the myth of growth at all costs, which is leading us straight into the wall. Already in 1972, in its famous report, Meadows, stressing "the limits of growth", the Club of Rome invited us to reflect on these subjects. But the main tasks still lie ahead, and must necessarily combine ecology, economy, social and politics over the coming decades.

What key actors should address and deal with these questions. Do engineers, researchers and start-ups have a special role to play?
Would the European project, and its generosity, have been born without the two great wars? More than ever, we will have to reason tomorrow using the human development index, based on three components: the standard of living, but also health and education. This will require even more solidarity among States at globally, in contrast to the reflex of closing frontiers, which is understandable in times of crisis, and also the rediscovery of the beautiful word of fraternity, which is part of the republican triptych, and which should be at the heart of tomorrow's hopes. ■ **KD**

TERRITORIAL THÉMATIC AGGREGATES

Value-adding to water

The water aggregate is one of the seven territorialised thematic aggregates of the Oise Metropolitan Pole (PMO). Launched in June 2019, it reflects on various current issues relating to the treatment of urban and industrial waste water, the management of surface and underground water resources and the production of drinking water.

Edvina Lamy, lecturer-cum-research scientist, qualified professionally in water treatment and processes, was appointed the academic in charge last June. Its vocation? "The challenge for the region is to create voluntary cooperation between companies, academia and local authorities in order to develop a network of skills to manage water resources as efficiently as possible and to respond to the economic, societal and environmental challenges of this specialty" recalls Edvina Lamy who, for almost a year now, has been setting up collaborative projects that bring together public and private partners interested in the challenges of the "Water" sector, i.e., the search for savings, value creation or adaptation to climate change, to name but a few examples.

Very concrete projects

With six meetings already organised within the partner structures, the projects that have been put forward are already taking shape. Among them, the reuse of waste-water from the waste-water treatment plants as an alternative source of water resources. Or the management of groundwater via groundwater management and the use of rainwater for a sustainable building. "It seems necessary to establish an overall strategy, particularly concerning the need to have a territorial project that allows the "water" issue to be taken into account as a whole, including a multitude of small water management projects, but also to reason on the scale of the basin for a project of general interest, which does not target a single user. There is indeed a need for cooperation between the territories to respond to the concepts of sustainable development" There is clearly a need for territories to cooperate in order to comply with the concepts of sustainable development", asserts Ludvina Lamy

Driving a full, innovative and dynamic policy

This aggregate brings together the laboratories of UTC and UniLaSalle: UTC-TIMR, UTC-Avenues, UTC-GEC and AGHYLE. The local authorities are also very present: ARC, ACSO, CC2V, CCPE, SMOA and DDT Oise. Among the industrial players, the aggregate can already count on Veolia Water. "On the territories, a whole sector is thus in action in order to build a dynamic of innovation around the question of water that best meets the economic and environmental stakes of our time", concludes Edvina Lamy. It is important not to forget that, in all cases, regulatory barriers remain depending on the use of this resource. But each time, it is a question of working on demonstration sites to prove the solution provided in terms of sustainable development. It is the future that is being prepared in this way on the ground."re that is being prepared in this way on the ground. ■ **KD**

UTC students with Tenneco & Co working for the Planet's future

Tenneco is an American automotive equipment supplier based in Crépy-en-Valois since 1933. For several months, the company hosted a group of students from the UTC who were able to reflect on concrete actions to improve industrial performance, taking into account the environmental challenges of the Picardy-based company.

Nineteen UTC students worked for six months between the school and the Tenneco site in Crépy-en-Valois. Objective: to reduce common industrial waste and the company's energy consumption. With real economic and environmental stakes for a life-size awareness. Tenneco manufactures protection systems for components such as cables and hoses. In addition to the automotive industry, and various protection systems, Tenneco are also employed in power generation, the aeronautics and aerospace sectors, also marine, rail and other industrial sectors. "Our group was mobilised to find effective solutions to reduce energy consumption by 5% per year by 2024 and to reduce OIW, common industrial waste, by 20%. How can waste be recovered? We were all in autonomy with a teacher to supervise us. We drafted three reports during the semester. To achieve this, we set up three teams: energy, waste and global vision. We were very well received by the company, which was particularly involved in our project," says Julie Tardy, 22, in her 5th year of mechanical engineering. The young Lyonnaise is targeting the supply chain and environmental lean management professions. The third team's mission was to look for labels and accompany change within the company, for example in terms of training on how to sort waste better.

The transformation of our Western production and consumption patterns will undoubtedly accelerate in the years to come so that human activity remains, or rather becomes, sustainable in the long term.

A new mindset

The operation, which began in September 2019 and was completed in January 2020, has thus borne fruit. Useful both for the company and for the students. "The gains were numerous for all of us. To begin with, it was very instructive to carry out a group project in almost total autonomy. It was a great way to develop the skills and qualities of each of us. We very quickly had to set up a very specific organisation to create a link between us and communicate well. So much for the human aspects," continues Julie Tardy. Technically, we learned a lot, for example about the state of research in these fields, but also how to obtain quotations, contact companies and manage a project from A to Z. "So many students who were already aware of environmental issues long before, but who now, at the heart of a targeted company, were able to be better informed and bring about a real change in thinking".

A career launch-pad

"Projecting oneself into a professional reality was most relevant for the school and for these students. The company also asked some of them to do a bit of foresight on the evolution of the Planet and the challenges that Tenneco could encounter by 2050 and the operational tools for its subjects," emphasises Valérie Moreau, professor-researcher in the Mechanical Engineering department at UTC, satisfied with the relations established with Tenneco well upstream, notably through the UTC trainees already welcomed before this Eco-Group. "The transformation of our Western production and consumption methods will undoubtedly accelerate in the years to come so that human activity remains, or rather becomes, sustainable in the long term," she adds. Not all our students are yet fully aware of this, and a minority of companies are just beginning to make the transition. The UTC, as a university and engineering school, has an essential role to play in drawing links between international scientific knowledge and the local implementation of techniques and methods that will make it possible to address the challenges of our century. This project is one such link. It does not solve everything, but it allows us collectively and individually to start projecting ourselves towards a new reality. » ■ **KD**

COVID-19

A hospital to save a hospital

At the end of February, the Covid-19 epidemic spread rapidly in Mulhouse and the French Grand Est. The Mulhouse hospital saw a flood of patients saturating its intensive care unit. The decision was therefore taken to install a Military Intensive Care Unit of the Armed Forces Health Service (EMR-SSA). Patrick Hokayem, who graduated from the UTC in biological engineering in 2004 and is now a project manager at the central management of the Armed Forces Health Service, led this deployment, quite extraordinary in terms of design and technical execution.

Patrick Hokayem has always been passionate about health technologies. "During my third year at university, I discovered the UTC, founded by Guy Deniélou. "I was totally convinced by its "à la carte" teaching system, this encouraged me to apply and I was admitted to the bioengineering specilaisation. I was particularly attracted to biomedical technologies because they are constantly evolving. Furthermore, biomedical technology paves the way for industry, engineering offices, hospital architecture and design, application engineering and training, etc. "

As a young graduate, he first worked for a small start-up company as an application engineer in the field of neurological diagnosis. "I then worked as a process qualification/validation engineer at the French Blood Establishment where I helped modernise the technical platform for the preparation of labile blood products," adds Patrick Hokayem, who then joined the French Army Health Service (SSA) as a contract officer. He began his career at the central equipment establishment of this same service, as a methods engineer in charge of the design of field hospitals and their integrated medical environment. "Then I worked for eight years as a hospital biomedical engineer in charge of maintenance and medical investments". In 2015, he joined the operations division of the SSA's central management as project manager for a health armament programme, in conjunction with the French Defence Procurement Agency (DGA). "The initial information system I head now concerns telemedicine".

The army health service usually deploys small or medium-sized structures on operations, where the wounded soldier has the shortest possible stay before being repatriated to metropolitan France. Here, we had to create and deploy ex nihilo a real reanimation ward structure with 30 beds.

explains Patrick. "That's how I learned to deploy in the Barkhane theatre in the Sahel, but also within the units of the French Navy, a remote medical expertise solution that enables advice on the care of sick or wounded soldiers. This support reduces the isolation of our projected health personnel, who benefit directly from the support of military hospitals in mainland France. »

In March, Patrick Hokayem was given the task of deploying the thirty-bed EMR-SSA as quickly as possible in Mulhouse. A major challenge, because it is very unusual: "The SSA usually deploys small or medium-sized structures on operations, where the wounded soldier has the shortest possible stay before being repatriated to mainland France. Here, we had to create and deploy ex nihilo a real 30-bed intensive care unit." His team, the military medical supplies and the medical regiment are coordinating with the technical management of the Mulhouse hospital to solve the many problems that arise: the structure's architecture, purchases and medical supplies, care teams that are not up to speed with the implementation of complete reanimation environments under canvas...,"However, Patrick is pleased to say, "this hasn't prevented us from doing things in complete safety! "And it was achieved, in just six days, between the order given by the President of the Republic and the actual reception of the first patient.

As the pressure on the Mulhouse hospital's intensive care unit eased, the EMR-SSA has not seen any more patients since May 7. However, the

dismantling of the structure also brought its share of problems, as Patrick confirmed:

"Among the problems to be dealt with, there was of course the complete decontamination of everything before repatriation of the structure... In addition, the SSA must be ready for any other request."

This epidemic and the challenges it has brought with it have taught Patrick a lot: "Above all, a lot of humility in the face of the suffering of patients and their loved ones.... Then, as a soldier used to engagements during external operations, it is a joy and a pride to directly support our own people: the French population! And finally, in spite of the difficulties, it is above all a magnificent human experience shared by the various parties involved, both civilian and military! What a beautiful sharing of culture and what a beautiful symbioses!" ■ **MB**

Photo credits French Defence Ministry

ECOSYSTEM

A well-inspired governance

UTC is also involved in sustainable development. This does not only mean addressing issues related to ecology and global warming, but also reflecting on the impact of its decisions on social issues, ecosystems and future generations.

Since 2009 and the Grenelle 1 law, the State wishes to set an example. As a result, all higher education institutions are required to adopt a 'Green Plan' and to make an official commitment to this approach. This dimension has always been acceptedas a matter of course for UTC. Humanism, interculturality, cooperation with students, industrialists, other universities - which make up the DNA of UTC, show this clearly. The school is affected in its teaching missions as it trains the engineers of tomorrow so that they become actors of the future economic life. The question of sustainable development (SD) concerns today - and even more tomorrow - all professions. They must be made aware of it. Students are particularly active and concerned by this issue. They are demanding a real SD dimension in the UTC teaching curricula. "This question also permeates the university's research projects, and also cutting across projects involving several laboratories: bioeconomy, chemistry, etc., green, health, transport and sustainable cities ", explains Lucie Dourlens, UTC sustainable development (SD) officer. In its support functions, each department of the school has the capacity, at its level, to carry out its missions by following certain sustainable development objectives. This does not always involve actions that require significant financial or human resources, but often involve integrating this dimension in the associate professions.


LUCIE DOURLENS

Truly concrete examples

The sustainable development and social responsibility (SD&RS) approach consists of following the sustainable development objectives among the 17 established by the United Nations. "Currently, I can see that many actions are being carried out. We can mention, for example, the student actions through their Associations such as On veut durable, Compiègne en transition or Cac'Carotte, as well as the desire to integrate this dimension into student events. The Tous Unis pour la Cité event also encourages territorial anchoring", lists Lucie Dourlens. On the research and teaching side, let's note UTC's commitment to the Sorbonne university alliance in the SFRI call for projects. For the support functions, we can highlight actions such as waste sorting, eco-grazing, actions in favour of the inclusion of students and staff with disabilities, making premises accessible, improving the energy efficiency of buildings or replacing equipment with less energy consuming ones. There is a strong willingness on the part of the current governance for a stronger and more visible investment by the UTC in the issues of sustainable development and social responsibility. If the UTC feels ready, after the definition of the main objectives on which we want to work, the next step could be certification. ■ **KD**

START-UP

BotDesign, serving both patients & care workers

The Covid-19 epidemic led to hospital overcrowding and highlighted the difficulty of maintaining links between patients and their families. The start-up BOTdesign has chosen to commit itself to the fight against Covid-19 by donating tools to help hospitals overcome these problems.

In 2017, Olivier Thuillart, a graduate of UTC and Dr. Jean-Louis Fraysse, with their perfect knowledge of the field of health and chronic pathologies, founded BOTdesign and launched the development of tools that comply with French legislation concerning health data: A Chatbot for obstetrical pre-anaesthesia, or for the follow-up of diabetic patients, instant and secure messaging for healthcare needs; the projects follow one another for the start-up.

In 2020, Olivier Thuillart and his team are mobilised in order to adapt their tools and develop new ones to best respond to the issues raised by the epidemic. IZYcall and Covibot are examples. The two solutions already in place at Toulouse University Hospital. "We have also set up a chatbot service for the Amyotrophic Lateral Sclerosis (ALS) department, which enables doctors to monitor the morale and state of health of these particularly at-risk patients," adds Olivier. A fund-raising campaign (€1 million) is being finalised before the summer to enable nationwide distribution.

Such tools will undoubtedly become more widespread, as the current health situation demonstrates the value of setting up remote and secure monitoring and communication tools between patients, their families and medical staff. ■ **MB**


OLIVIER THUILLART

IZYCALL

This secure mobile videoconferencing solution enables patients to be connected from their hospital room to their family or a doctor, or to a health professional. The application has already registered more than a thousand connections since the beginning of April.

COVIBOT

This conversational robot carries out the Ministry of Health's daily questionnaire with the Covid-19 patient at home to assess his state of health. Depending on the answers, it can accelerate the frequency of the questionnaire and alert the medical team in charge of the case-file.

VALÉRIE GUÉNON

Pragmatism at its best

Valérie Guénon graduated from UTC in mechanical engineering (Materials and Technological Innovation) in 1986, and has spent her entire career with Safran. She is currently Director of Safran's Product Environmental Policy. Interactions has singled out a lady whose footsteps reflect a highly pragmatic career.

Why do you invoke pragmatism ? "Because I needed some at one point. I was a good student and I could have done a Bac C[1] at the time, but I followed the Lycee's D stream out of interest in the natural sciences. But this choice closed the door for me to the classic "prepas" at engineering schools," recalls Valérie Guénon. And your choice to go for UTC ? "It has imposed itself very quickly, because it trains engineers with an integrated preparatory course, recruits future students on the basis of a dossier, including those with a Bac D, and offers a biological engineering branch. Another particularity that appealed to me: during the interview, recruiters were not only interested in the grades but also in my person," she adds. However, I got a "slap in the face" in the first semester of the year by failing the two main UVs. But this in no way diminished my determination, as I was not allowed to do so. From that point on I didn't fail any more and I even finished among the best in the class," she says. At the end of the core curriculum, pragmatics takes over again: she chose the Bio-Engineering branch rather than Mechanical Engineering. For what reason?" It was when I learned that all students at the time finding work within three months of graduation, except for the girls in the Biological Engineering branch, which I changed my mind," she adds. A choice that she does not regret at all and which allowed her to make a choice that was rather rare in the 1980s, to carry out two long internships abroad. "In my 4th year, I did a first six-month internship in the Netherlands. And in the 5th year, with all my UVs validated in the first semester, the UTC offered me the opportunity to do a master's degree which, in the United States, takes two years. I left for two years at the University of Delaware in their Mechanical and Aerospace Engineering department, combining the last year of my engineering studies with the first year of my Master's degree", stresses Valérie. Guénon. In 1988, on her return from the United States where she turned down a job offer at Dupont de Nemours, and with her double degree in her pocket, she was offered three jobs: one at Renault, the other at the GIAT - renamed Nexter in 2006 – and finally at Snecma. She chose the latter which, following the 2005 merger with Sagem, became Safran. Specialising in composite materials, Valérie Guénon initially held various technical positions there. Then, after becoming Head of European research programmes for the Safran Group, she took part in the creation of the Clean Sky[2] programme launched in 2008. In 2009, she became Quality Director at Safran Landing Systems, then Director of institutional affairs for the Group's research and technology, and finally Head of Safran University before taking over as Head of environmental policy. Her role as Director of the Product Environmental Policy of Europe's leading aeronautical equipment manufacturer? "On the one hand, this involves representing the Group vis-à-vis the international institutions which establish regulations relating to the environmental footprint of aviation, such as the International Civil Aviation Organization (ICAO), an international body that is an independent body of the UN), but also European and international institutions. And, on the other hand, to coordinate the group's actions in this area, whether technical or communication-related. The latter being of crucial importance at a time where the environmental footprint is in the spotlight", explains Valérie Guénon. In addition to this major role, there is a second one: the definition of an environmental strategy for the design of future products. "We are facing a major challenge: that of reducing the environmental and climatic footprint of aviation and anticipating the tightening of future international environmental standards, especially as our products are designed to last for decades. We must therefore not be mistaken about their performance in general and that of the environment in particular," she adds. ■ **MSD**

BIO NOTES

1981 : admitted to UTC
1985 : admitted to the University of Delaware, USA
1988 : joined Snecma (now called the Safran Group Aircraft Engines) as a composite materials engineer
2007 : creation, with other European partners and the European Commission, of the research programme Clean Sky
2019 : Director of Safran Product Environmental Policy

[1] Bac S, specialization in maths and/or physics
[2] https://www.cleansky.eu/

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