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From resilience to recovery

The Covid-19 pandemic was a major shock worldwide, disrupting everyone's lives and bringing about numerous tragedies among our loved ones and within our communities. École Polytechnique, its students, faculty, staff, alumni, and partners, all of whom share the same values of duty and contribution to the common good, went through an intense experience.

Thanks to the commitment and dedication of all, the School's resilience has ensured the continuity of its fundamental missions of education, research, and innovation and draws on all of its resources to overcome this situation and prepare for the future.

The Covid-19 pandemic has also highlighted the critical role of scientific research to ensure the control of risks, including natural ones. Such control used to be taken for granted. The pandemic demonstrated the importance of sound scientific training for managers and experts, both from the public and private sectors. Looking beyond this health crisis, we are facing a vast number of challenges in the areas of security, climate or economy, and scientific progress will continue to provide answers to these challenges.

The collective handling of this unprecedented crisis has been remarkable thanks to the discipline and sense of responsibility that everyone has demonstrated. It was also made possible by the unprecedented support from the state, the commitment of local authorities, and economic actors. The response to the pandemic has demonstrated the importance of putting operational responsibilities as close to the ground as possible, so as to be agile enough to meet immediate and future challenges.

The move to remote working has changed the way we look at the possibilities of technology in many work environments, including higher education. It has also shown the importance of adjusting our organizations and nurturing human contacts. It is up to the School to continue to shape the future by reinventing the student experience for a greater impact, combining digital communications, teamwork, and strong interaction with professors.

The recovery from this period will require a massive effort, and École Polytechnique, through its education, research, and innovation missions, will fully play its part.

Active on many fronts, the School has continued to contribute to the deployment of Institut Polytechnique de Paris, which brings together its strengths alongside those of four other prestigious engineering Schools - ENSTA Paris, ENSAE Paris, Télécom Paris and Télécom SudParis - with the ambition of positioning itself among the best science and technology institutions in the world to meet these many challenges.
“Throughout this prolonged health crisis, our priority has been to protect the health and integrity of all and to ensure the continuity of our fundamental missions. The commitment of the entire École Polytechnique community was remarkable.”

François BOUCHET
Managing Director

The Covid-19 pandemic was a major shock and École Polytechnique relied on its founding values to face and overcome it. The School and its community have also mobilized to prepare for the future.

**Adaptation and resilience**

Throughout the year, the School ensured the continuity of its core missions. This resilience was based on the dedication and adaptability of all teams and the sense of duty of all staff, both in core business and in support functions. A special mention goes to the military leadership who stayed in constant contact to support and train the students. This commitment has made it possible to preserve the physical and mental health of all, to maintain face-to-face classes (academic and sports) whenever possible, and to allow for a minimum of student life. In particular, the School ensured an operational switchover to digital technology in record time. It has preserved the functioning of its laboratories and their research capacities and has continued to support its innovation ecosystem.

Thanks to a tight-knit community, the School has maintained the major events that make it unique: its competitive entrance exams with decentralized written and oral exams in 9 centers in France and in Morocco, initial military training for the X2020 class, followed by a period of human and military training in the armed forces or civilian organizations, training of 20 future reserve officers (ORSEM) at l’X, major military ceremonies for the Ingénieur Polytechnicien students, and graduation ceremonies.

**Crisis Management**

A crisis unit set up as early as January 2020.

**Military ceremonies maintained**

Presentation of the flag of the X2019 class in the presence of the Chief of Staff of the French Land Forces, General Thierry Burkhard.

**Bastille Day**

Forty Ingénieur Polytechnicien students took part in the military ceremony organized at the Place de la Concorde to celebrate Bastille Day on July 14th.

**INGÉNIEUR POLYTECHNICIEN PROGRAM EXAMS**

The written exams were held from June 22-26, 2020 and the School was the only one among the French “Grandes Écoles”, to have organized oral exams.

**L’X relied on its digital communication tools to maintain the link with its community. It reinforced its presence on social media and launched a podcast, Sigma. (Available in French only)**
École Polytechnique’s Executive Education team mobilized the School’s professors and researchers to offer the larger École Polytechnique community the perspectives from l’X top experts on the analysis of the crisis and its consequences in the form of recurring webinars, titled “The l’X Minutes.”

**PROSPECTS**

**The l’X Minutes**

École Polytechnique’s Executive Education team mobilized the School’s professors and researchers to offer the larger École Polytechnique community the perspectives from l’X top experts on the analysis of the crisis and its consequences in the form of recurring webinars, titled “The l’X Minutes.”

At the Drahi X-Novation Center, protection materials against Covid-19 have been produced since the beginning of April 2020 thanks to the joint work of the volunteer teams from the l’X FabLab and Valéo.

**Preparing for the future**

Thanks to its scientific excellence, l’X was fully involved in the fight against the pandemic. Its role is also to train the next generations to be capable of dealing with this type of situation that could repeat itself. The digital switchover that took place during the lockdown periods amplified the pedagogical transformations already in progress for the content and formats of academic courses, but also in operational management. It has also altered societal organization and the needs to which teaching and research institutions will be called upon to respond in the future. Finally, l’X and Institut Polytechnique de Paris have been involved in the French government and the European Commission stimulus plans designed to boost recovery post-crisis and prepare for the future.
2. IP Paris: Stepping up the rollout

Officially launched in May 2019, Institut Polytechnique de Paris brings together the strengths of five prestigious engineering schools (École Polytechnique, ENSTA Paris, ENSAE Paris, Télécom Paris and Télécom SudParis). In 2020, IP Paris has established itself as a world-class scientific and technological education and research institution and has stepped up its rollout in its main missions of education, research, and innovation. The Institute has developed relationships with companies and with its academic partners internationally, while strengthening its organization and enhancing its reputation and visibility. École Polytechnique has remained strongly committed to the development of this ambitious project with its partners.

A successful start for the first academic year

The first academic year of the Masters and PhD Tracks was a success with more than 3,700 students applying for the 15 Masters degrees and more than 7,500 enrolled, and 354 applicants for 19 PhD Tracks. Its academic offer has been formalized after receiving the accreditation to deliver national diplomas and the ability to carry out research.

Achievements in research

The development of interdisciplinary centers has reached a new stage with the launch of Hi! PARIS, in partnership with HEC Paris, a center dedicated to Data Science and Artificial Intelligence, and the development of the Energy for Climate (E4C) center, dedicated to energy transition. The ten strategic research areas identified within IP Paris have been formally organized into research departments. New sources of funding for research have already been tapped thanks to the establishment of a Grants Office, the development of sponsorship for interdisciplinary centers, and the first partnerships for Chairs at the IP Paris level, such as one with Accenture.

Initiatives for innovation and entrepreneurship

As part of its strategy to promote research, technology transfer is a key issue for Institut Polytechnique de Paris, which has launched two calls for incubation projects. IP Paris has also entered into a partnership with France Digital, which brings together French digital entrepreneurs and investors. IP Paris has adopted a common brand name, “Novation Center”, for the incubators of its partner schools. The Institute has acquired a stake in the SATT Paris-Saclay, which promotes research and supports technology transfer from laboratories in the Paris-Saclay cluster to companies. It is an active participant in the PEPITE network of student entrepreneurs in collaboration with the Université Paris-Saclay. The creation of an innovation and research park to the east of the campus meets the strategic challenge of increasing proximity to companies and developing the research and innovation ecosystem of Institut Polytechnique de Paris. The future research center on low-carbon energy of the energy company Total will be the first location in this innovation and research park.

Enhanced governance

Institut Polytechnique de Paris enhanced its governance in 2020 with the first meeting of the International Scientific Advisory Board (ISAB) in February 2020, which is made up of eminent international scientists whose research covers all of IP Paris’ disciplinary fields. The ISAB is thus responsible for supporting IP Paris in the shaping of its strategic orientations of its scientific policy. The Academic Council (Cac), a consultative body called upon to give its opinion on educational offerings and the research and development policy, held its first meeting in March and regularly brings together the Institute’s academic teams.

Increased visibility

In 2020, Institut Polytechnique de Paris entered international rankings for the first time (CWUR, Academic Rankings of World Universities). Ranked in the Top 50 for its entry into the QS 2022 list of the world’s best universities, IP Paris is thus positioned among the most reputable science and technology institutions worldwide. Only two years after its launch, IP Paris is also ranked 15th worldwide in terms of the reputation of its graduates among employers.

IP Paris has revamped its website to better promote its achievements in France and abroad. The launch of the online review, Polytechnique Insights, was prepared throughout the year. Dedicated to understanding the challenges of research and innovation in fields related to science and technology, this free online review highlights researchers and their work by covering a wide range of subjects, from fundamental to applied research.
JUNE 16TH
1st Digital Scientific Day.

JUNE
1st international rankings.

JULY
1 million euro grant from the French Ministry of Higher Education, Research and Innovation (MESRI) to support blended learning projects.

SEPTEMBER
1st year of the Masters & PhD Tracks.

SEPTEMBER 15TH
Launch of Hi! PARIS.

SEPTEMBER 21ST
Professors-Researchers seminar.

OCTOBER 14TH
Launch of the 2nd E4C international student challenge.

OCTOBER 27TH
Launch of IP Paris’ new website.

NOVEMBER 2ND
Launch of 4 Research Graduate Schools (EUR).

NOVEMBER 20TH
First international agreement on thesis co-supervision, in partnership with Shanghai Jiao Tong University (SJTU).

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NOVEMBER 18TH
Signature of a strategic partnership with Accenture.

DECEMBER 2ND
Results of the call for student projects.

DECEMBER 11TH
Admission results of the first joint international recruitment for the engineering cycles.

DECEMBER 15TH
Board approval of the campus master plan.

DECEMBER 18TH
Results of the 1st call for pre-maturation projects with 700,000 euros of funding.

DECEMBER 18TH
End of the consultation «IP PARIS and you».

DECEMBER 19TH
IP Paris and Inria strengthen their partnership in Digital Science and AI.

JANUARY
Results of the 1st call for pre-maturation projects for research transfer.

FEBRUARY
Novation Centers: a common brand for IP Paris incubators.

FEBRUARY 26TH–27TH
1st meeting of the International Scientific Advisory Board (ISAB).

MARCH 13RD
1st meeting of the Academic Council.

Highlights 2020

FOCUS

IP Paris: Stepping up the rollout
3. Sustainable Development
Commitments fulfilled, an ambitious goal of carbon neutrality

In 2020, École Polytechnique has kept its ambitious commitments to make Sustainable Development a strategic priority. It began this process by involving its students, research faculty, and staff in this long-term process. The completion of a carbon assessment has made it possible to set concrete objectives for reducing its emissions and to identify the levers for action to achieve them.

At the international symposium “Reflexions: Researching, training, and acting for Sustainable Development” in June 2019, the School took five major commitments that are now part of its strategy:

1 - The implementation of a certification for education in Sustainable Development

The School has continued its work on the implementation of this certification, which is intended to offer in-depth training on sustainability issues to all engineering and Masters of Science & Technology (MSc&T) students. The format and contents of this certification will be defined in conjunction with the Technologies for Transition Chair, which is the subject of a strategic partnership between Institut Polytechnique de Paris and the consulting and technology firm Accenture.

2 - The training of 100% of its students in Sustainable Development

A second compulsory Sustainable Development seminar for all engineering students was organized over the course of a week in April 2020.

3 - The creation of an interdisciplinary center on renewable energy

Launched in June 2019, the Energy for Climate Center (E4C) has been deployed and brings together experts from some 30 laboratories and 240 permanent staff mobilized around 8 research axes. The first smart building demonstrators (three electrical smart grids and one thermal smart grid) have been installed on campus buildings to conduct experiments. The E4C center has developed its academic programs of interdisciplinary Masters dedicated to energy and the environment as well as four PhD tracks. It supports innovation through an energy entrepreneurship track offered to Masters and PhD students looking to create a start-up. The E4C center was one of the contributors to the first regional report on climate in the Mediterranean, MedECC, which received the North-South 2020 Prize from the Council of Europe for the quality of its work.

4 - The launch of an international student challenge

Launched in 2019, the E4C Student Challenge offers universities, international and interdisciplinary teams the opportunity to combine their expertise in science and technology, economic and social sciences and management to design projects with a strong social and environmental impact. The virtual award ceremony for the first edition, aimed at imagining a carbon-free city, highlighted the projects of more than 100 students from 10 different higher education institutions. The winning projects, “Metr’Eau’Pole” and “Waste Not, Want Not”, respectively propose the recovery of thermal heat from wastewater and the recovery of biogas used to produce electricity. For the second Challenge, launched in October 2020, students will compete on the theme: “Objective carbon neutrality 2050: local variations”.

5 - The goal of a carbon neutral campus

As a major step in the path towards the School’s carbon neutrality objectives, a new carbon assessment of the campus was carried out between May and July 2020, making it possible to identify the main sources of greenhouse gas emission reductions and to prioritize the levers for action.

A new carbon footprint assessment, action levers identified, defined objectives

Knowing one’s carbon footprint is a prerequisite to defining emission reduction objectives and identifying action levers.

A new greenhouse gas emissions assessment was therefore carried out between March and July 2020. It favored a systemic approach by seeking to take into account all direct and indirect sources of carbon emissions and by integrating the School’s various partners, departments, and associated services (laboratories, catering, sports facilities, etc.).

It shows a total carbon footprint of 15,586 tons of CO2 equivalent (tCO2e) for the year 2019, or 2,82tCO2e per campus user, whereas a reduction in the total carbon footprint of each French person to the equivalent of 2tCO2e would be necessary to respect the limits defined by the Paris Agreement. In terms of energy, the École Polytechnique campus requires 11tCO2e per year per user.

The assessment identified six areas of direct and indirect emissions from the campus - energy and buildings, mobility and transportation, procurement and research equipment, digital technology, catering, and waste - which are all areas for improvement.

Three of them account for 80% of emissions: energy (36%), buildings and research equipment (24%) and mobility, which includes business travel by plane and commuting (20%).

This carbon footprint assessment is the starting point for the campus’ sustainability goals: a 30% reduction in carbon emissions by 2030 and achieving carbon neutrality by 2050.
With global climate change intensifying, energy security is needed now more than ever. Energy consumption occurs in every aspect of human life; it includes uses for manufacturing, business transactions, agriculture and food production, water use, construction and development, and travel. Transportation is a precursor to all of these functions of society, and this movement, too, requires energy, with the sector comprising 20% of global energy consumption (Risø National Laboratory for Sustainable Energy 2009). Virtually every current form of transportation uses fossil fuels, emitting CO\textsubscript{2} and other greenhouse gases (GHGs) which ultimately leads to global climate change by trapping heat in the Earth's atmosphere. In 2019, the transportation sector produced more carbon pollution than any other sector of the US economy over a 12-month period since 1979 (U.S. Energy Information Administration 2019). Further, approximately 85% of these emissions are related to the surface transportation system — federal highways, public roads, and the like (U.S. Department of Transportation Federal Highway Administration, 2016). In order to reduce the effects of climate change, it is imperative to focus on creating carbon-neutral solutions for transportation across all sectors and geographical locations, but especially in cities as the world is becoming increasingly urbanized and the large portion of human activity will happen at the urban and peri-urban levels (UN Department of Economic and Social Affairs 2018).

Emissions have declined significantly in France over the past 25 years, reducing 16.4% of GHGs from 1990-2015 (Planete Energies 2018). However, the downward trend has stopped since 2015. According to the latest European estimates, energy-related CO\textsubscript{2} emissions have increased an average of 1.8% annually in the European Union (Eurostat News Release 2018). On the other hand, cities, states and nations alike have committed to combating this trend of increasing emissions by introducing low-carbon or carbon-reduction plans. France committed to a 40% reduction in 1990 emissions levels by 2030 in their National Low-Carbon Strategy (Ministère de la Transition écologique et solidaire 2019). From a longer-term perspective, France hopes to achieve a 75% reduction in emissions compared with pre-industrial levels (known as “factor 4”) by 2050. Transportation makes up the most heavily emitting sector in France, releasing about 29% of the country’s emissions, followed by the residential-tertiary sectors at 16.5%. Because of the country’s unique nuclear capacity, France’s electricity sector emits very little CO\textsubscript{2}, about 7% of total emissions, a quarter of the European average (Planete Energies 2018). Figure 1 demonstrates the electricity mix of the country. While the region plans to scale down nuclear generation by 2035, they have invested in other renewable technologies as a replacement. International Energy Agency (IEA).
4. A modern and welcoming campus

The School has adopted a master plan for the organization and development of its campus to improve the working and living environment of its students, faculty, and staff while strengthening its attractiveness with the ambition to reach the highest standards in terms of Sustainable Development and architectural policy and quality.

The improvement of campus life and the development of the campus is a priority of the shared project of Institut Polytechnique de Paris under the leadership of its Campus Life Committee.

The main purpose of this committee is to draw up a master plan for the long-term development of the Institute’s campus. Its guidelines are to be set out in a concerted master plan and will be implemented over time with the cooperation of all stakeholders.

The Institut Polytechnique de Paris campus extends from the ENSTA Paris building in the east to the Télécom Paris and Télécom SudParis premises in the west and it encompasses the ENSAE Paris building in the south. It benefits from a natural setting between a wooded hillside to the south and a natural park including a pond to the north, on the edge of the agricultural land of the Saclay plateau and the Palaiseau forest.

The master plan of Institut Polytechnique de Paris ensures the coherence of all its real estate projects and allows for the management of major projects to provide it with an exceptional campus. Several major infrastructure developments are underway. Construction of the mechanical engineering department’s building has begun and should be completed within two years. Meanwhile, construction work on the Shared Teaching Building and the new SIRTA meteorological laboratory has already seen good progress.

The Institut Polytechnique de Paris campus will be organized around an east-west axis punctuated by public spaces. École Polytechnique will remain at the geographic center of the Institut Polytechnique de Paris campus with housing to the south, sports and outdoor facilities to the north, while the east of the campus will host the future innovation and research business park offering opportunities for partnerships and economic development.

Pedestrian and bicycle paths are planned between the various educational, research, innovation, living, sports, and leisure facilities.

A consultation has been launched for the implementation of a shared electric mobility project to allow campus users to rent electric cars to get around the plateau starting in 2021. New electric bike stations will also be installed. Vehicle traffic and parking will be kept on the verge of the campus.

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The footpath to the Lozère station of the RER B train has been redeveloped and now allows access to the Saclay Plateau with a bicycle or luggage.

A fitness trail has been developed around the pond.

The construction work for the Mechanics Hub have been launched...

...as well as the work for the meteorological laboratory SIRTA.

A future line 18 of the Greater Paris Metro, currently under construction, will improve the conditions and means of access to the campus. It will link the campus to Paris and Orly airport via the Massy-Palaiseau TGV and multi-modal station. Thus connected to Paris, the train stations and the airports by automobile and public transport networks, Institut Polytechnique de Paris is open to the world.
“The rollout of Institut Polytechnique de Paris opens up new perspectives for the fundamental education and research missions of École Polytechnique. They have already begun to materialize in 2020.”

Yves LASZLO
Provost of École polytechnique
1. EDUCATION

“2020 was a pivotal year for education. On the one hand, with the rise of the School’s academic programs, but also with the first materializations and new perspectives of the training programs carried out jointly within Institut Polytechnique de Paris.”

Dominique ROSSIN
Vice-Provost for Education

To meet the many contemporary challenges in health, climate, and society, and to seize the opportunities opened up by digitalization and ever more advanced scientific challenges, École Polytechnique continues to adapt its academic programs by relying on its key strengths: the selectivity of its recruitment, the interdisciplinarity of its curricula, its international openness, and the excellence of its faculty and research. As a result, the School ranks 15th among the world’s top universities for the employability of its graduates according to the 2021 QS World University Ranking. The 2020 First Employment Survey for the Ingénieur Polytechnicien Program and the survey of MSc&T graduates have once again confirmed how attractive these degrees are to companies.
More than 3,000 people attended professional development programs and 770,000 signed-up for l’X MOOCs.

3,443 students in initial training
465 faculty staff
102 nationalities represented
23% female students

INGÉNIEUR POLYTECHNICIEN PROGRAM
Recognition confirmed, evolution underway

The engineering cycle has confirmed its attractiveness and its national and achieved international recognition, with 5,662 French candidates registered for the competitive entrance examination, 1,035 eligible for 425 places. In addition, 129 international students were accepted. The engineering cycle confirmed its first position in the rankings of French engineering schools and its international influence, with 23.3% of foreign student engineers recruited. A review is underway to adapt its curriculum to the challenges of the coming decades, in order to ensure its attractiveness among the best French and international students.

BACHELOR’S DEGREE
Successful first graduation and growing momentum

Launched in 2017, this research-based program, taught by École Polytechnique faculty, celebrated its first graduation in 2020, and confirmed that it opens the door to excellent career paths both in France and internationally, with more than 70% of its graduates joining top-ranked universities worldwide or in France to pursue their studies. With the integration of 114 students in 2020 (versus 83 in 2019), the Bachelor of Science program has continued to grow and confirm its international recognition. The most recent class includes 80% international students from 38 countries.

MSc&T
Diversity and high employability for a community of over 300 Alumni

The Master of Science and Technology (MSc&T) program at École Polytechnique welcomed 275 students for the start of the 2020/2021 academic year, including 145 newcomers, 30% women and 60% international students coming from 47 different countries. With the graduation of the third class in September 2016, the MSc&T cycle, created in September 2016, will represent a community of more than 300 alumni. The First Job Survey of the 2019 graduates published in January 2020 showed a high level of employability with 82% of graduates recruited by companies, and more than two-thirds recruited before the end of their program. The dedicated career support program, Explore Your Future, enabled 130 students to prepare for their professional future by taking part in thematic workshops and individual coaching sessions, as well as two key events in November and December, Company Days, two days of meetings with recruiters and presentations by partner companies with the students of the eight MSc&T programs. In addition, an Industry Week organized around meetings and conferences with companies or laboratories whose research fields are more specifically related to energy and the environment, was offered to students of the STEEM program.

EXECUTIVE EDUCATION
A key player, a renewed offer

In order to support decision-makers, experts, and individuals facing the new challenges that have emerged with the Covid-19 pandemic and the measures taken to curb it, L’X Executive Education (X-EXED) has adapted its training courses, developed new offerings such as the “Digital Transformation Strategist” program, and launched thought-provoking webinars, “The L’X minutes”, to better meet the expectations of its targeted audiences.

EXECUTIVE MASTER
The opening of a second class in sight

Launched in 2017, the Executive Master program has continued its growth with the maximum number of 36 participants reached for the start of the 2020 school year and a waiting list already in place for 2021. With 80% of the courses taught by L’X research professors, the program’s ambition is to train executives with approximately 20 years of professional experience in the fields of innovation and technology each year. The opening of a second annual class is planned for early 2023 with a curriculum offered 100% in English to meet the growing demand from international participants.
Graduate of the Bachelor of Science Program, Kayo Yin, wins the 2020 Global Undergraduate Awards.

The SULTAN project, led by five students from École Polytechnique, wins the Black Out Challenge launched by Safran Electronics & Defense.

L’X wins the prestigious SWERC programming contest and qualifies for the world finals.

Speeches delivered by Eric Labaye and Benoît de Ruffray, CEO of Eiffage and patron of the X2020 class.

Start of the academic year for the MSC&T students.

Success for the first Bachelor of Science class, celebrated during a virtual ceremony with students and their families.

Graduation ceremony of the 2nd Executive Master class.

Start of the academic year for the Executive Master program.
EDUCATION

The School has stepped-up the implementation of its social diversity plan.

In October 2019, L’X presented its report on social diversity, which set out ten measures to double the number of scholarship-funded students in the engineering cycle while respecting the requirements of excellence and fairness that have prevailed since the School’s creation. In one year, the School has made significant progress in implementing this plan, with strong involvement from its students. In particular, its tutoring activities have enabled it to reach high school students in one high school out of five in France.

For the first time, the entrance exam for the Ingénieur Polytechnicien Program was held with special arrangements for disabled students.

Gender diversity, an ongoing effort. Thanks to the work of its Diversity and Success Center, the School has continued its actions in favor of gender diversity in order to raise awareness among high school girls and future female students in scientific fields and to strengthen their presence in its various programs. The Bachelor’s program is setting an example with 43% female students at the start of the 2020 academic year. The School is particularly committed to respecting gender parity in its recruitment, internal promotion, and wage policies for its staff.

International diversity, a recognized advantage. This year, the School confirmed its international outlook and paid particular attention to welcoming and supporting its international students while continuing to ensure the internationalization of the recruitment of its faculty and staff.

Diversity box: One year after the report and commitments

The School has amplified its commitment and efforts to value and promote diversity within its ranks. In Spring 2020, it set up a cross-functional diversity-equity mission and appointed a diversity delegate to ensure that this area of development is fully integrated into all its activities. The Diversity and Success Center has also greatly expanded its actions.

“Our actions in favor of diversity have progressed significantly over the last twelve months, which marks a change in scale for the School in this area.”

Marie BRESSON
Senior Advisor, Diversity & Inclusion

EQUAL OPPORTUNITIES

In the second half of the year, École Polytechnique worked on the rollout of an awareness raising campaign aiming to promote the most prestigious scientific higher education programs among high school students. During this campaign title "Operation Monge", scheduled from January to March 2021, Ingénieur Polytechnicien students were sent to 600 high schools and were able to reach out to 16,000 high school students.

First virtual Science Camp, the X-Science Camp@home, for 200 high school students and 100 future students of preparatory classes from low-income backgrounds.

Girls & Maths Day.
L’X welcomes 130 middle and high school girls for a day dedicated to the place of women in mathematics.

The French Education minister Jean-Michel Blanquer and two junior ministers Geneviève Darrieussecq (secrétaire d’Etat auprès de la ministre des Armées) et Gabriel Attal (secrétaire d’Etat auprès du ministre de l’Education nationale) came to École polytechnique to launch the 2020 recruitment campaign for the Service National Universel, designed to promote a sense of civic duty and national unity among teenagers.
In 2020, research at l’X continued to be integrated into Institut Polytechnique de Paris, which provides it with enhanced resources and development prospects. Researchers and laboratories at École Polytechnique have been distinguished for their work and their projects have benefited from prestigious European funding, underlining their contribution to meeting the scientific, technological, and societal challenges of tomorrow.

“The quality and performance of research conducted in l’X laboratories have once again been acknowledged by prestigious awards, numerous publications in renowned journals, and notable success in calls for projects and in major international rankings.”

Benoît DEVEAUD
Vice-Provost for Research
The École Polytechnique develops cutting-edge fundamental and applied research to meet the scientific, technological and societal challenges of the future.

1,632 research staff
70 nationalities represented
23 laboratories
1866 publications

An integrated research strategy at Institut Polytechnique de Paris

The School has continued its strong contribution to the development and implementation of the research strategy of Institut Polytechnique de Paris. IP Paris merges fundamental and applied research, both disciplinary and interdisciplinary, within 10 research and education departments as well as two interdisciplinary centers dedicated to Energy, Climate, Artificial Intelligence, and Data Science. All in all, IP Paris brings together 30 laboratories, 40 teaching and research chairs, 950 teacher-researchers and 1,000 PhD students.

Prestigious European funding

The European Research Council (ERC) has selected five research projects put forward by researchers from the School’s laboratories. Landry Bretheau and Manas V. Upadhyay, Assistant Professors at École Polytechnique in the Departments of Physics and Mechanics, have respectively been awarded 2020 ERC Starting Grants to help them set up their research teams in the fields of quantum circuits and additive manufacturing. The ERC has also selected two ambitious “ERC Synergy” projects involving researchers from l’X laboratories: AWACA, which aims to reconstruct the Antarctic water cycle by combining modeling and measurements, and HOPE, which will seek to understand the formation of the hippocampus in the brain. Finally, Laeticia Cunqueiro, a specialist in high-energy nuclear physics, has been awarded an ERC “Consolidator” Grant. She will join the Leprince-Ringuet Laboratory to carry out her research.

On the occasion of the 35th anniversary of the invention of the chirped-pulse amplification technique (CPA), for which Donna Strickland and Gérard Mourou, Professor Emeritus of the École Polytechnique, won the Nobel Prize, prestigious researchers from all over the world met at École Polytechnique to discuss its major applications and promising prospects.
Results of research conducted in the School’s laboratories were showcased in major publications and journals throughout the year. A total of 1,866 rank A publications were counted, including the release in Nature of the results of the Tokai2Kamioka (T2K) international experiment in Japan on quantum oscillations of neutrinos, in which the team of Michel Gonin, CNRS Research Director at the Leprince-Ringuet Laboratory (LLR), was involved. This experiment is included in the prestigious top 10 scientific discoveries of 2020 in Nature. Research from the Plasma Physics Laboratory (LPP) was published on the front page of the journal Physics of Plasmas. Research from the Laboratory for Irritated Solids (LIS) was published in Nature Physics, the Intense Lasers Laboratory (LULI) in the Astrophysical Journal, and the Laboratory for Optics and Biosciences (LOB) in Optica. The research of Marc Graille and his team in molecular biology has been published in the Nucleic Acids Journal and EMBO Reports. Researchers from I’X and more generally from E4C have contributed significantly to the MAR1 report, the first regional climate report for the Mediterranean, which was awarded the North-South 2020 Prize by the Council of Europe, a prize that could be compared to the European equivalent of the Nobel Peace Prize.

Honored researchers

L’X laboratories received numerous awards in 2020. The CNRS awarded four Talents medals (silver, bronze, crystal, and collective crystal) to researchers, engineers, and technicians from laboratories at the School. Tatiana Novikova received the G.G. Stokes prize for her work on polarization and was elected a member of the Optical Society of America (OSA). Isabelle Méjean was elected best young economist 2020 by the French newspaper Le Monde and the Cercle des Economistes and was promoted to the rank of “Chevalier” in the French Order of Merit. Emmanuel Beaurepaire was distinguished by the European Society of Microscopy, which awarded him the Prize for Life Sciences. Mathieu Rosenbaum received the Louis Bachelier Prize from the London Mathematical Society, the SMAI, and the Natixis Foundation.

Cécile Patte, a doctoral student in the joint MEDISIM team at Inria and the Solid Mechanics Laboratory, is one of the winners of the Jeunes Talents France prize “For Women in Science” awarded each year by the L’Oréal Foundation and UNESCO to promote women in science.

Isabelle Méjean, a professor at the Ecole Polytechnique, was awarded the 2020 Best Young Economist Award by the newspaper Le Monde and the Cercle des Economistes. Her work focuses on the effects of trade globalization, particularly on the structure of international value chains.

The results of the Tokai2Kamioka (T2K) international experiment in Japan on neutrino oscillations involving the research team of Michel Gonin, CNRS Research Director at the Leprince Ringuet Laboratory made the front page of the leading scientific journal Nature. The European Research Council selected two ambitious “ERC Synergy” projects involving researchers from Polytechnique laboratories, notably Christophe Genthon and Emmanuel Beaurepaire.

The French National Centre for Scientific Research (CNRS) awarded 4 “Talents” medals for researchers, engineers and technicians in our laboratories: Silver medal for Silke Biermann, Bronze medal for Nathanaëlle Schneider, Crystal medal for Dimitri Edouart and Collective Crystal for the technical team of the Apollo Research Infrastructure.

Cécile Patte, a doctoral student in the joint MEDISIM team at Inria and the Solid Mechanics Laboratory, is one of the winners of the Jeunes Talents France prize “For Women in Science” awarded each year by the L’Oreal Foundation and UNESCO to promote women in science.

The French National Research Agency selected Pierre Boyer’s TAXREV project for its “Young Researchers” 2020 program. By analyzing “Tax reforms and revolts in democracies”, his objective is to analyze the tensions between economically optimal and politically feasible tax systems.
OUR MISSIONS

3. INNOVATION

5,200 square meters dedicated to entrepreneurship and innovations

1,000 square meters of prototyping spaces

25 start-up hosted on site in 2020

+ de 200 individuals received support at the X-FAB prototyping space
École Polytechnique has intensified its actions in favor of innovation and entrepreneurship. In an economic and financial environment that was severely disrupted by the Covid-19 pandemic, the School has strengthened interactions within its ecosystem of start-ups dedicated to innovative and high value-added technologies. Its entrepreneurship and innovation center, the Drahi-X Novation Center has made new investments to support its development over the next five years. L’X start-ups have once again distinguished themselves with numerous awards while several of them have completed major fundraising.

**Strengthened interactions in a difficult context**

No fewer than 150 workshops, discussions, and face-to-face meetings were organized in 2020 as part of the X-Up incubation program, the X-Tech business incubator, and the FabLab, the Drahi-X Novation Center’s prototyping space, which assisted more than 200 people over the course of the year. The launch of the X-Novation Talks in September encouraged meetings between entrepreneurs, researchers, and companies. The international CEO Talks, which provide an opportunity to exchange ideas with start-up founders from around the world, were held for the third time in 2020, with events in San Francisco, Boston, and Tokyo.

**Investments to support development**

The Drahi-X Novation Center has hosted 12 start-up classes since its launch in 2015 and has supported 88 of them within the X-Up and X-Tech programs. To support its development, the Drahi-X Novation Center has made new investments in machines to expand the field of possibilities in additive manufacturing, notably with the acquisition of a high-precision 3D printer by stereolithography, a 5-axis machining center, and traditional metalworking equipment.

Since February 2020, a single brand, Novation Center, reflects the common identity of the entrepreneurial entities of the Institut Polytechnique de Paris. Fourteen start-ups from the Polytechnique community, founded by former students of the school and/or incubated within the Drahi-X Novation Centre, are among the top 100 start-ups in which to invest spotted by the French business magazine Challenges for 2020.

**ThrustMe** announces its first contract with the European Space Agency to demonstrate the world’s first iodine electric propulsion system in space. Founded in 2017 by Ane Aanesland, Director of Research at CNRS, and Dmytro Rafalskyi, researcher at the Laboratory of Plasma Physics, ThrustMe designs miniature thrust systems for small-sized satellites.

Farmwise, co-founded and managed by Sébastien Boyer (X2011), selected in the TIME ranking of the 100 inventions of the year in the sustainability category, for its agricultural weeding robot.

Christelle Rohaut (X2013) joined the 2021 Forbes 30 Under 30 list (Consumer Technology category) with her start-up Codi, an economically and socially beneficial home office-sharing company.
New achievements in entrepreneurship

L’X gives an important place to intrapreneurship by offering large companies access to its community through a presence for those who wish to do so within the Drahi-X Novation Center. This incubation program of “X-Corporate” accounts is designed to provoke and/or accelerate their development. This symbiosis has led to the launch in 2020 of an innovative ceramic-based product and a “white” fragrance to eliminate bad smells in cars, the result of a collaboration between Valeo and the Israeli start-up Moodify.

Award-winning start-ups, major fundraising

L’X start-ups have once again distinguished themselves in numerous awards and rankings in 2020, with 9 of them appearing in the French Tech Next40 ranking, while 7 were distinguished by the i-Lab competition and 14 in the annual Challenges magazine’s annual ranking of the 100 start-ups to invest in. In 2020, start-ups from the l’X community raised over 870 million euros, with several emblematic deals such as those of Stilla Technologies, Tehtris, Le Wagon, and Sensome.

The X-Impact Tech Award, launched by the graduates of the second class of the École Polytechnique’s Executive Master the École Polytechnique incubator, the École Polytechnique Foundation and with the support of class sponsor Jacques Veyrat (X83) honoured four projects (Spirus, Sonio, La Tannerie végétale and Moskito).

7 start-ups created by X alumni won the i-Lab competition, one of which Alice & Bob got a Grand Prix.
PARTNERSHIPS

INTERNATIONAL
Positioning l’X on the world stage, promoting exchanges and cooperation

With more than 200 international agreements, École Polytechnique has built a prestigious network of partners around the world and is part of leading academic networks such as the U7+ Alliance, EuroTech, and the Alliance Program with Columbia University. École Polytechnique now focuses its strategic partnership policy on around twenty leading universities.

By relying on this network, École Polytechnique encourages its students and faculty to be internationally mobile and welcomes 40% international students in its programs. The quality of the accommodation and support services for international students has enabled École Polytechnique to obtain the “Bienvenue en France” label. The international influence of École Polytechnique is also part of the international policy of Institut Polytechnique de Paris.

EUROTEQ ENGINEERING UNIVERSITY
Creating the engineering education of tomorrow
L’X is a founding member of the EuroTeQ European University, a new academic approach that integrates pedagogical innovation and connection between campuses and aims to strengthen the links between the education of excellent engineers and the actors of society and industry.
> Learn more

U7+ ALLIANCE ANNUAL PRESIDENTS SUMMIT
Leadership from member universities met to discuss intergenerational justice as well as the U7+ Alliance’s engagement with the G7 and the ethical applications of Artificial Intelligence.
> Learn more

Students of the Internation Exchange Program of Ecole polytechnique.
NEW PROGRAM HEALTH
dedicated to the management of innovation
X EXED’s partnership with ESA Lebanon to offer a new program dedicated to innovation management in the health sector, “Innov’Health”.
> Learn more

INTERNATIONAL SPONSORSHIPS
Strengthened cooperation with Ivory-Coast
A new partnership with the Ivory Coast’s Ministry of Petroleum, Energy, and Renewable Energies strengthens the cooperation between École Polytechnique and Institut National Polytechnique Félix Houphouët-Boigny (INP-HB). The partnership will help to finance scholarships for Ivorian students admitted to the Specialized Master’s in Renewable Energy (ETRE) co-created by INP-HB and École Polytechnique in the framework of the Franco-Ivorian Hub.
> Learn more

INTERNATIONAL MOBILITY
Partnership with Israel ans Iran
École Polytechnique has won an Erasmus+ international mobility call for students and staff with its partners in Israel and Iran that will run from August 1, 2020 to July 31, 2023.
> Learn more about Erasmus +

EIFFEL SCHOLARSHIP
Seventeen l’X students among the 2020 winners
Seventeen international students from École Polytechnique are winners of the Ministry of Europe and Foreign Affairs’ scholarships for excellence, illustrating École Polytechnique’s international influence.
> Learn more
Exchanges and collaborations between the School and its corporate partners have seen new developments in 2020. The School’s attractiveness was confirmed with the success of the 27th edition of the X-Forum and the choice of the l’X site as a showcase for innovative and technological achievements with high impact. The strengthening of interactions between public and private research was demonstrated by the renewal or conclusion of new sponsorship agreements and academic and research chairs.

The installation of a new innovation and research center for low-carbon energies by Total is the first step in the development of a business innovation and research park. Supported by the Paris-Saclay Public Development Agency, the park is designed to meet the strategic challenge of reinforcing the ties with businesses and developing the research and innovation ecosystem of Institut Polytechnique de Paris.

It will foster closer interaction between public research and private R&D and foster the development of job opportunities for PhD and post-doc candidates. It will also increase the funding of projects and theses, and allow the development of an entrepreneurial ecosystem.
AN UNMANNED SEAOWL SHIP REMOTELY operated by satellite from l’X
On September 10-11, 2020, the l’X campus hosted a demonstration of a satellite remote controlled unmanned ship off the coast of Toulon, France. A first for the world, illustrating the involvement of l’X, its students, teachers, researchers, and alumni in the development and mastery of the most advanced technologies (the ship detection and classification module was developed by two students from the X2018 class), took place in the presence of the French Secretary of State for Digital Transition, Cédric O, and the French Minister of the Sea, Annick Girardin.

HEALTHCARE DATA STUDIED by a new sponsorship
In response to the technological challenges linked to data in the medical field, Sanofi, École Polytechnique and its Foundation launched the “Digital Innovation and Data Science for Healthcare” program, whose research and teaching bring together machine learning, statistical modelling, and medicine. 
> En savoir plus sur le mécénat

A SPONSORSHIP to develop space training
École Polytechnique, Thales Alenia Space, and ArianeGroup launched the “Space Science and Challenges of Space” sponsorship program. Together, they are developing space education at École Polytechnique and supporting the Student Space Center’s projects.

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L’X RANKINGS

N° 1 in France and N° 30 in the world for graduate employability and student-to-staff
- THE 2020

N° 2 in France and N° 30 in the world for graduate employability and student-to-staff
- THE 2020

N° 1 in France and N° 32 in the world for the most international universities
- THE 2020

N° 2 in France and N° 87 in the world
- THE 2020

N° 61 in the world and N° 2 in France
- QS 2021

QS WORLD UNIVERSITY RANKINGS

N° 61 in the world and N° 2 in France
- QS 2021

N° 1 in the French rankings of the best Engineering Schools
published by
- Le Figaro
- L’Etudiant
- L’Usine Nouvelle

L’X RANKINGS