I-SITE
UNIVERSITÉ
LILLE NORD-EUROPE

Transition(s).

[Chapter 3]

July 2021

OUR FOUNDING INSTITUTIONS

OUR SPONSORS

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VITAL AND NECESSARY transitions

Emmanuel Duflos,
Director of Centrale Lille and Treasurer of the I-SITE ULNE Foundation

Precision health, science for a changing planet, a human-friendly digital world, and changing cultures, societies, and practices: each of these subjects has unquestionably shown, through recent developments, how essential it is to both our present and our future. The past few months have shown us that not only are transitions under way in each of these areas, but that above all, these transitions are necessary and vital for the generations to come. It is exciting to realise that I-SITE ULNE's partners are already in possession of the basic building blocks needed for them to join forces to create the disruptive innovations that will enable our societies to overcome the immense challenges they now face.

To assist them, the I-SITE ULNE Foundation has utilised its own resources to fund staff positions for I-SITE member institutions since 2017. It has also leveraged the collective strength of its members to obtain additional funding from numerous institutions (including the Greater Lille Authority and regional and European funding agencies) and secure funding through other competitive grants (including EU funding and France's Investments for the Future Programme). While the initial budget allocated by the ANR to fund the I-SITE ULNE initiative was only €74 million, €99 million has already been distributed, primarily in four broad areas: research, education and educational innovation, technology transfer, and international development.

Looking back over the past few years, it is clear that we have been able to successfully implement a robust and forward-looking funding acquisition policy. As the recipient of ten million euros in funding from the Greater Lille Authority and three million euros from the Hauts-de-France Region and ERDF, the PreciDIAB National Center for Precision Diabetic Medecine project is just one emblematic example of this. Yet it is far from the only one. The MEL also allocated over four million euros in support of "Sustain & Expand" pilot projects. The Hauts-de-France Region has also committed to an additional €700,000 in funding for COVID-19 research and the cross-border network. The PEARL project for PhD research led by I-SITE ULNE, jointly funded through Marie Curie COFUND actions as part of the European Commission's H2020 programme, has offered funding for 30 PhD students to conduct interdisciplinary research on topics related to I-SITE ULNE's research areas. Ultimately, an additional €2.44 million in funding has been secured through the PEARL project. The I-SITE initiative has also mobilised support for teaching activities. For instance, at the height of the COVID-19 pandemic in 2020, the Foundation provided over €700,000 in funding to assist institutions with the sudden shift to remote learning. In 2020, the financial support distributed to I-SITE ULNE's member institutions also increased, growing from €16 million in 2019 to €42.8 million.
Member institutions also received support indirectly through I-SITE ULNE's contributions to the cost of consulting services for grant submissions (e.g. for the SFRI, IDéES, and Equipex+

programmes), its support for the creation of the Experimental Public Institution (EPI), and its assistance in evaluating PEARL and early-career researcher projects. In 2020, the Foundation increased its capacity to contribute to these support costs by 74%.

With the creation of the EPI on 1 January 2022, the I-SITE project will enter an entirely new phase. To carry out its strategy, it will then be able to rely on the extraordinary spirit of cooperation and the successful funding acquisition efforts that have come into place over the past four years and have undeniably achieved very positive results for the finances of the I-SITE ULNE Foundation.

"I-SITE ULNE's partners are in possession of the basic building blocks needed for them to join forces to create the disruptive innovations that will enable our societies to overcome the immense challenges they now face."

3 questions with

Philippe Vasseur

Chairman of the Rev3 Programme

How does the Rev3 Programme respond to specific challenges in the Hauts-de-France region?

Rev3 aims to transform our region so that it can become one of the most advanced in Europe in the Third Industrial Revolution, which is characterised by transitions in every area. The Hauts-de-France region is no stranger to change.
The decline of the coal and steel industries is a major example. We know – because we have all collectively experienced it – that it is vital to prepare for these changes in order to better overcome them. Standing still is not an option! Instead of being a victim of change, we must transform it into an opportunity. In the midst of a Third Industrial Revolution that is completely redefining life as we know it, this is what we aspire to do: put our region at the forefront of this global transition.

What do you expect from academia?

The contributions that can be made by the world of higher education and research are obviously fundamental. Rev3 relies on three pillars: governments, economic stakeholders, and academia. Each of them must work hand in hand. Universities and grandes écoles play a key role, due to the need to be able to leverage the necessary skill sets in our region. We need to be able to count on professionals who are able to understand the complexity of the changes that are under way. The I-SITE Foundation's work corresponds perfectly to this idea. Particularly important is its focus on interdisciplinarity, which is vital to ensuring that young people from our region are prepared for the jobs of the future, which we cannot necessarily predict in five or ten years.

How can the geographical location of the Hauts-de-France region be used to our advantage?

The proximity of several other north-western European countries is a definite asset for us. For the young people from our region, it is an opportunity, as we are geographically close to other cultures quite different from our own in regions that are facing similar challenges. For instance, a key challenge awaits as electric cars are projected to become more and more widely available. This is an important issue, and it is entirely in our interest to reach out to our Belgian neighbours on the issue of electric cars. Generally speaking, the creation of a truly cross-border network with the support of the I-SITE Foundation is an excellent development that can only help foster new opportunities for our students and researchers on issues that are shared on either side of the border.

PRECISION **health**

To break new ground, precision healthcare must be tied into other fields (the environment, artificial intelligence, social sciences). This is the approach championed by the I-SITE Foundation, with results that show the potential of Lille's Higher Education Institutions (HEIs) in a favourable institutional context itself demonstrated by the creation of a Faculty of Healthcare and Sports Sciences.

National support for world-class projects made in Lille

The fifth "University Hospital Healthcare Research" (RHU) call for proposals has just been launched. This flagship "Investments for the Future" call for proposals offers substantial support (grants up to €10 million) for translational or clinical research partnership projects paired with theoretical research in biology, epidemiology, or the social sciences. The aim of RHU calls is to enhance patient care, our understanding of diseases, and the performance of our healthcare systems. In Lille, I-SITE ULNE's partners have joined forces to give an edge to applicants. Two projects have already won RHU calls in previous years. The RHU-2 "PreciNASH" project, coordinated by François Pattou, focuses on NASH (non-alcoholic fatty liver disease). It aims to identify a biological signature that would enable patients to avoid undergoing liver biopsies and pave the way for the discovery of new therapeutic targets. The RHU-3 "WILL-Assist" project deals with the Von Willebrand factor, a key factor in blood coagulation. Its goal? To model and prevent the risk of bleeding associated with new ventricular assist devices. For this latest call for proposals in 2021, three new projects have been preselected by the Biomedical and Public Health Research Committee. These projects, which

"Having participated in its deployment and served on the evaluation committee for the Health PhD programme from the outset, I can say just how successful it has been, and just how capable and enthusiastic the young researchers we have supported are. This is certainly an initiative worth pursuing in the future!"

Frédéric Gottrand,
Vice-President for Research on the Lille University Hospital Executive Board

"The experience of working on the task force will remain in our memories as a key moment in the organisation of the I-SITE's health research teams in relation to its researchers from other fields."

David Launay,
Chairman of the CRBSP and coordinator of the Lille COVID Task Force

already receive support from I-SITE ULNE, deal with neurodegenerative diseases, scleroderma, and the first 1,000 days of life. Applications will be submitted on 1 July 2021, with responses scheduled to arrive this autumn.

Boosting university hospital research

Completing a PhD dissertation in medical school is often no easy feat. The constraints of hospital work and medical studies often do not make to feasible "leave" full-time healthcare work to spend three or four years on PhD research. Consequently, most young doctors, pharmacists, and dentists conduct PhD research in suboptimal conditions, both for their clinical work and for their research. Since 2018, the Health PhD programme has financed five to ten PhD fellowships per year to allow these healthcare professionals in training to step back from clinical work for a year (renewable for an additional year) to work on their university dissertation at the Lille Doctoral School of Biology and Health. During this period, PhD candidates can devote themselves full time to their research within their host laboratory while being paid an amount equivalent to the salary of a fourth-year medical intern. This Health PhD programme represents a unique opportunity to increase the number and the quality of university PhD dissertations written by Lille's young doctors, pharmacists, and dentists.

"Lille's medical research teams are particularly active in instituting partnerships with healthcare companies, which helps speed the transfer of their research into society."

Étienne Vervaecke,
Director of the Eurasanté Health Cluster

Health and the environment: from territory to people

Overseen by Luc Dauchet and Cécile Vignal, this I-SITE ULNE project examines the relationship between health and the environment in the Hauts-de-France region to help guide policymaking in the area of preventive healthcare. It relies on a multifaceted interdisciplinary approach that combines the expertise of doctors, epidemiologists, mathematicians, environmentalists, chemists, historians, and sociologists. Using existing epidemiological databases on Crohn's disease, chronic end-stage kidney disease, and premature birth in the general population, the project's researchers are working to geographically map these conditions and correlate them with sociological and environmental data. A second component of the project aims to evaluate levels of atmospheric pollution biomarkers in over 3,000 patients from the Lille and Dunkirk metropolitan areas. A final component aims to develop new individual microparticle exposure measurement devices.

From London to Lille: Metabolomics and precision health

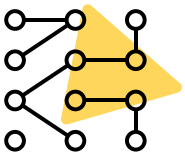
This year, I-SITE ULNE has joined forces with the Lille European Metropolis (MEL) to improve Lille's capacity to host internationally renowned researchers. Marc-Emmanuel Dumas is one of the beneficiaries of this joint "Talent Attraction" programme. This year, he will leave London to take up residence in Lille, where he will join the EGID (European Genomic Institute for Diabetes) lab and the team working on PreciDIAB (National Center for Precision Diabetic Medicine). A biochemist and CNRS research director, Marc-Emmanuel Dumas worked at the École Normale Supérieure of Lyon before moving on to Imperial College London, where he heads the Microbiome Network. His research explores the impact of metabolomics and microbiomics, two new fields in biology, on metabolic diseases, inflammation, and cancer.

Using AI to help diagnose inflammatory diseases

Chronic inflammatory diseases (CIDs) affect young populations and have a significant impact on their family, social, and work lives. They vary widely in terms of their clinical presentation, biological profile, and the ways they evolve over time, all of which adds to the complexity of providing care to patients. A key concept in the field of personalised medicine, "endotypes" are subtypes of medical conditions defined by distinct molecular mechanisms or responses to treatment. The ENDOMIC team, coordinated by Professor Vincent Sobanski (University of Lille and Lille University Hospital, Institut Universitaire de France junior member), is working to identify CID endotypes through multidimensional integrative analyses of highly phenotyped patients (with clinical data from the FHU PRECISE project and the INCLUDE healthcare data warehouse [PHENOMIX research cluster] and omics data generated by teams at the INFINITE research centre). Chosen as one of the five national winners of the 2020 Inserm-Inria Digital Health Project Team CFP, this project represents a significant step toward the establishment of an innovative classification system, simultaneously integrating a large number of variables and accounting for variations over time. With the help of artificial intelligence, this new clinical classification of CIDs will profoundly reshape the doctor-patient relationship and will undergo an extensive evaluation. The progress made in the approach to clinical variance will benefit patients suffering from many different diseases characterised by disparate clinical presentations and variations over time.

SCIENCE FOR
a changing planet

The "Science for a changing planet" hub is working to study and understand the Earth's system and make a positive impact on its future, particularly through the study of celestial bodies and the development of a planet-friendly circular economy, in attempt to make society more resilient and respectful of humankind.



Creating a use for plant products and byproducts

Single-stage process development through hybrid catalysis

A winner of funding from the French government's "Make our Planet Great Again" initiative, this project is coordinated by Dr Élise Albuquerque Mota (Brazil), who joined Lille's Catalysis and Solid-State Chemistry Research Unit (UCCS) on a postdoctoral fellowship. Its primary aim is to transform crop residues from the Hauts-de-France region into products with high added value. It is part of the broader CatBioInnov project funded by the Greater Lille Authority (MEL), I-SITE ULNE, and the Hauts-de-France Regional Council and coordinated by scientists from the UCCS (Fabio Bellot Noronha, Ivaldo Itabaiana Jr, and Robert Wojcieszak). Through innovative biomass fractionation technology and the development of new hybrid catalysts, lignocellulosic (plant) biomass will be transformed, in a single-stage process, into biofuel and/or chemical intermediates for the pharmaceutical and chemical industries.

Developing advanced biotechnologies

Coordinated by Rénato Froidevaux and funded by I-SITE ULNE, the Lille European Metropolis, the IAR Bioeconomy Cluster, and Clubster NHL, the Charles Viollette Industrial Chair was created to develop ways to leverage industrial biotechnologies (fermentation and enzymatic biocatalysis) to create a use for plant products and byproducts. This chair is able to harness the expertise of INAF (Quebec's Institute of nutrition and functional foods) and the cross-border BioEcoAgro research unit, in addition to the participation of multiple industrial partners (French Endive Farmers' Association, Leroux, PremierTech, Eurabiotech, VFBioscience, Gecco, and Extractis). It offers an integrated value chain using different sources of products and byproducts: biochemical characterisation, biotransformation, identification of biological activity. This project integrates a teaching component for Master's and engineering students, including, in particular, innovation workshops.

Studying extremely fragile matter

Part of an international consortium formed to assist with Japan's Hayabusa2 space mission, the TEM-Aster project is working to develop novel methods of structural and chemical analysis via electron microscopy for studying asteroid samples. The aim is to render it possible to offer new insight into the early phases of the formation of our solar system. The space mission returned to Earth in December 2020 with the first samples from a carbon-rich asteroid. This extraordinarily delicate celestial matter will soon be studied at the University of Lille in the Institut Chevreul's UMET laboratory. The carbon-rich matter and hydrated silicates will be observed at the nanometric scale using electron microscopes. The TEM-ASTER project also includes a significant science outreach component and a partnership with the artists-in-residence at Le Fresnoy – Studio National des Arts Contemporains.

Replacing fossil-fuel vehicles with electric vehicles

Within the ReCaBio research cluster, the interdisciplinary CUMIN (Innovative and Carbon-Neutral University Transport) project run by the L2EP laboratory aims to make the University of Lille's Cité Scientifique campus a model in the area of electric transport. The 5,000 people who travel to the campus each day using combustion vehicles account for over 50% of the campus's greenhouse gas emissions. CUMIN's work focuses on the production of renewable energy on campus, the improvement of electric vehicles, the acceptability of electric vehicles, and the economic models needed to implement this transition. The inclusion of (electrically propelled) biohydrogen fuel-cell vehicles, the fuel for which is produced through ReCaBio's catalytic technologies, is part of this complex equation.

Designing more eco-friendly clothing

Sustainable design is an essential step toward reducing negative impacts on the environment and enabling the transition toward a circular economy for textiles. Life cycle analysis is a crucial tool that must be used to guide, confirm, and communicate on design choices. Through joint funding from I-SITE ULNE and the Hauts-de-France Region, a PhD Student from the National School of Textile Arts and Industries' GEMTEX laboratory is working on this issue with the fabric company INDUO. The resulting research will generate inventory data on the life cycle of a large number of textile products on the basis of the physical laws governing the processes. The aim is to factor environmental impact into the parameter setting at each stage of the manufacturing process. The initial findings of this study will be applied to a range of high-end clothing manufactured by the company.

Simulating the ultimate fate of radioactive elements

The aim of the OVERSEE project is to develop multiscale molecular modelling methods to determine the ultimate fate of radioactive particles released accidentally. The challenge consists of modelling aerosols to combine different nanoscopic scales of simulation from the atomic level (high-precision quantum computing) to the nanoscopic level. The OVERSEE project is associated with two other European projects run by German and Dutch laboratories. New methods are being developed to precisely simulate the results of experiments through a wide range of spectroscopic techniques (UV-visible, Core-level, NMR, RIXS) to gain insight into the properties of the nanoparticles of radioactive elements. Implementing these computing methods on supercomputers will render it possible to generate simulations of systems down to the nanometric scale with pinpoint precision.

"Together, alongside partners from outside of academia, the University of Lille and the I-SITE Foundation are building a unique continuing education offering for professionals. The goal of the ExIST* programme is to offer lasting solutions regarding the qualifications and skills required by the global transition. The programme's first component, launched in September 2021, will focus on helping companies make the shift from a linear economy to a circular economy. ExIST will then move on to the other key focus areas of I-SITE ULNE."

Lionel Genetelli,
Head of the Department of development and engineering in continuing education and apprenticeship at the University of Lille

"Centrale Lille's three professorships – filled by F. Bello Noronha, I. Itabaiana, and M. Friend and jointly funded by I-SITE ULNE, the Lille European Metropolis, and the Hauts-de-France Region – represent an unprecedented opportunity that benefits from the REALCAT and UPCAT platforms that are shared with the University of Lille and hosted in our facilities. The competitive advantages such as the one created by obtaining a MOPGA** grant are already substantial, and they contribute to solidifying I-SITE ULNE's overall influence in research areas such as the bioeconomy and the circular economy."

Philippe Pernod,
Director for Research at Centrale Lille

* Executive Programme for Innovation and Social Transitions
** Make Our Planet Great Again

A HUMAN-FRIENDLY **digital world**

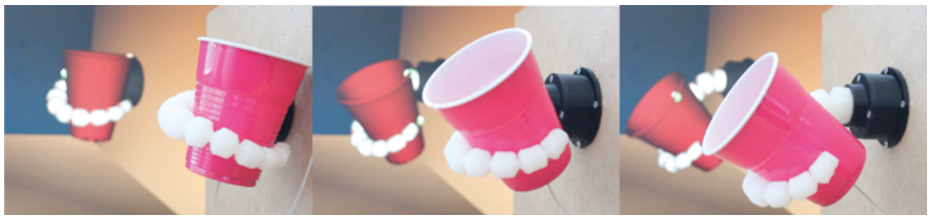
This hub has recently showcased the outstanding research environment fostered by its three research clusters

Six projects (photonics, nanotechnology, robotics, high-performance computing, metrology, and the relationship between technology and the humanities) were awarded Equipex+ ("Equipment of Excellence for Research") status as part of the fourth Investments for the Future Programme. Two Marie Sklodowska-Curie networks were established in the fields of Terahertz radiation (TeraOptics) and nonlinear fibre optics (MEFISTA), an area in which Lille also coordinates the newly created Elios research network. Three articles published in Astronomy & Astrophysics, co-authored by researchers at Centrale Lille, show how AI can use astrophysical observations to help reveal the physical mechanisms that drive star formation. Three professorship programmes were instituted with joint funding from the MEL:

- E-LoDi (Pascal Odoux, Bertrand Decaudin, Slim Hammadi): to create a centre for technological innovation in pharmacology, with the participation of CRIStAL (the Lille Research Centre in Computer Science, Signal and Automatic Control), GRITA (the Research group on injectable formulations and associated technologies), Lille University Hospital, and two companies: Computer Engineering and Altao.
- ANVI (Pierre Boulet), focused on neuromorphic video surveillance architecture, with the participation of CRIStAL, the IEMN (Institut for Electronics, Microelectronics and Nanotechnology), SCALab (the Cognitive and Affective Sciences Laboratory) and the Luxant company.
- TERIL-WAVES (Guillaume Ducournau): creating high-frequency communications solutions, with the participation of the IEMN (Institut for Electronics, Microelectronics and Nanotechnology) and MC2 Technologies, described on page 11 (Wireless communication).

Human-friendly robotics

The Defrost team (Inria/CRIStAL), led by C. Duriez (recipient of the French Academy of Science's 2020 Ernest-Déchelle Award), conducts research into modelling "deformable" (i.e. non-rigid) robots. The team is at the forefront of research into controlling robots with real-time calculations based on finite element methods and handling their interactions with their environment (2019 PhD dissertation award from the Robotics research network received by E. Coevoet). This research has numerous applications in the field of medicine, such as designing robots that are able to safely navigate within and interact with the body while adapting their rigidity to their surroundings during surgery. In addition, the arrival of T. Nazir (CNRS Research Director) has made it possible to question the impact of social robots on our everyday lives. Will they become our confidants, our friends, or will we always tend to treat them as inferior beings? One of the winners of the MEL's and I-SITE ULNE's "Talent Attraction" programme, her SOBARAG project studies the behavioural triggers (displayed by social robots) that will encourage us to treat them in a socially and ethically acceptable way.



How does the visual world appear to us?

One answer might be: "Open your eyes and see for yourself." But often, stimuli are too small, complex, or numerous to be clearly distinguished. Jointly funded by the French National Research Agency (ANR) and I-SITE ULNE, the Appearance Perception project is led by B. Sayim of SCALab. Through an interdisciplinary approach, it aims to reveal how these stimuli actually appear to us in order to understand the brain mechanisms behind visual perception. A joint PhD project funded in collaboration with KU Leuven is delving into the ties between spatial vision and digital cognition. Along with neuroscientists from the University of Bonn, technology that builds on earlier work from the field of astronomy (AOSLO systems) is used to target individual photoreceptors to determine how visual information is perceived. By establishing ties between the basic elements of spatial vision and the way in which large sets of different elements are perceived, this project aims to better grasp how the visual cortex constructs the sensory environment around us. This research is expected to have substantial impact in the field of artificial vision.

Wireless communication

The Lille site boasts world-class expertise in the field of Terahertz (THz) wireless transmission technology. This is a strategic technological field for the mobile networks of the future and a core focus area for the DyDiCo (Dynamics for DIsruptive COmmunications and COnnectivity) research cluster. The TERIL-WAVES industrial chair, jointly funded with the Lille European Metropolis, is the result of a collaboration between the IEMN (Institut for Electronics, Microelectronics, and Nanotechnology) and the tech company MC2-Technologies. This spin-off from the IEMN, created in 2004 to design super high frequency systems for civilian and military applications, is now diversifying its activities into superfast point-to-point broadband communications. The company aims to become a major European player in this market by 2025. For the third consecutive year, it has been featured on the Les Échos list of the 500 fastest-growing French companies. This industrial chair also benefits from the initial and continuing education offering of I-SITE ULNE's institutions, with the creation of a radio-frequency and telecommunications technical platform at Polytech Lille and an E-TECH Master's Degree, which is an integral part of the "Information and Knowledge Society" graduate programme.

Artificial intelligence in the limelight

Two researchers from the humAIn@ Lille cluster and members of the CRIStAL laboratory were selected for the "Research and Teaching Fellowships in Artificial Intelligence" call for proposals: P. Chainais for the SHERLOCK (Fast inference with controlled uncertainty: application to astrophysical observations) project,and R. Bardenet for the BACCARAT (Bayesian learning of expensive models, with applications to cell biology) project. Bardenet was also awarded a CNRS "Bronze Medal" in 2021.

Laboratories working together in the area of visual sciences and cultures

Leveraging the long-standing collaboration between the CRIStAL, SCALab, and IRHiS research laboratories, the "Visual Sciences and Cultures" Research Federation (FR SCV) was created on 1 January 2021 by the CNRS and the University of Lille. Able to harness the equipment the IrDIVE Equipex research platform and the availability of eight research engineers and administrative staff members, FR SCV aspires to become an international hub for the study of the intersection between the humanities and social sciences and digital sciences. It brings together nearly 150 researchers in a unique research programme on the role of visual cultures and their use by individuals and societies.

"I-SITE ULNE's funding enabled us to launch our international project on the ties between spatial vision and digital cognition. The combination of these two research fields is just the start of a long-term collaboration that will enable us to gain insight into the way numerosity emerges in the human mind via the properties of visual perception."

Bert Reynvoet,
Professor of Psychology and Research Coordinator at KU Leuven, Co-director of a joint PhD dissertation between KU Leuven and Lille

"Through its support, particularly from the DyDiCo cluster, I-SITE ULNE has allowed us to obtain the necessary proof of concept to establish larger projects: both nationally, such as the T-REFIMEVE Equipex+ project, and internationally, such as the European MSCA-ITN doctoral network MEFISTA. Proof of Lille's central role in the field of nonlinear effects in fibre optics can be found in the creation and coordination of the Elios research network."

Arnaud Mussot,
Lille coordinator of the T-REFIMEVE Equipex+, the MEFISTA-ITN programme, and coordinator of the new Elios research network

CHANGING **cultures,** **societies, and practices**

As major crises (environmental, health, economic, social) affect our societies, the humanities and social sciences offer keys for understanding them and reveal the challenges and issues related to the changes that they bring.

The foundations of labour law

The latter half of the nineteenth century saw the emergence of new policies governing labour relations across Europe. The creation of this new area of jurisprudence, today known simply as "labour law", is rooted in a historical context in which many countries – in the wake of Bismark's 1880s labour reforms – were eagerly competing to preserve their hegemony and have the privilege of being seen as a model for labour protection in Europe.
The CEPRESSE project is working to reveal the informal networks and academic exchanges on worker protection (colloquia and international organisations) that spread like wildfire during this period and contributed to the creation of a new international labour law system. By studying the extensive intellectual writings left behind by these networks, CEPRESSE offers an original perspective on the history of work and labour from an angle that has seldom been examined, social law, thus offering the potential to reveal valuable insights into those involved in building today's social Europe. Coordinated by Farid Lekéal, Professor in Legal History at the CHJ, this project, undertaken with assistance from specialists in social law, involves researchers from the Universities of Ghent and Uppsala.

CEPRESSE – Contribution to the Study of the Process of the Creation of European Labour Systems – Farid Lekéal – *Centre d'Histoire Judiciaire* (Centre for Judicial History – CHJ), UMR 8025

The generosity of the landscape

Bringing together philosophers, sociologists, linguists, architects, political scientists, landscape specialists, geographers, artists, and art historians, ExPAL studies the phenomenon of landscapes (and Europe's landscape in particular) as a shared resource. More than a visual or photographic experience, landscapes are a spatial, cultural, memorial, and political reality that force us to imagine a new political ecology in which generosity, inclusion, and openness play a central role. The project features the participation of several international partners* from the European InclusU network. It also benefits from a partnership between researchers at the University of Lille and the ENSAPL. Open to society at large, and working from a perspective that is both historical and forward-looking, ExPAL seeks to reveal Europe's generosity, not only in terms of geographical openness, but also in terms of the moral and political generosity that are at the heart of the European Union's aspirations.

ExPAL – Landscape of the European experience of generosity – Anne-Christine Habbard – Savoirs, textes, langage (Knowledge, Texts, and Language) research lab

* Babeş-Bolyai University, Romania; European University Viadrina, Germany; University of Wroclaw, Poland; Mykolas Romeris University, Vilnius, Lithuania

The experience of vulnerability during the COVID-19 pandemic: shifts in knowledge and solidarity

Coordinated by a team of sociologists and philosophers, the EVEREST project studies the experience of vulnerability during the COVID-19 pandemic by focusing on knowledge, its circulation, and social ties, whether these are related to geography or family. Analysing vulnerability means

"By leveraging world-class European research with an international and interdisciplinary scope, we can work together to overcome the challenge of building a more inclusive Europe. I-SITE ULNE, through its international projects and networks, makes a crucial contribution to the development of extremely high-profile partnerships."

Professor Sergiu Mișcoiu,
Director of the Centre for International Cooperation at Babeș-Bolyai University (InclusU European network)

Catherine Gaullier-Bougassas, a winner of the 2018 I-SITE ERC Generator CFP, was awarded an ERC Advanced Grant 2020 for her project AGRELITA: "The reception of ancient Greece in pre-modern French literature and illustrations of manuscripts and printed books (1320-1550): how invented memories shaped the identity of European communities." This project (2021-2026) will offer an original contribution to our understanding of the construction of European identity. Catherine Gaullier-Bougassas is a professor of medieval French literature and language at the University of Lille's Faculty of Humanities (Department of Modern French Literature), member of the Alithila (Literary analysis and language history) research laboratory, and honorary member of the Institut Universitaire de France.

"Not only do the existing synergies between I-SITE ULNE and the MESHS effectively contribute to furthering the status of the humanities and social sciences in the Hauts-de-France region, but they are also a nexus for the interdisciplinary, cross-cutting research that has now become vital to better understanding a constantly shifting social, economic, and cultural world."

Christophe Niewiadomski,
Director of the European Centre for the Humanities and Social Sciences (MESHS) Lille

simultaneously recognising its universality, its unequal distribution in society, and the moral implications that it involves. As a result of the arrival of mass information, growing uncertainty that renders decision-making more complex, and the shifts in social ties caused by the pandemic, understanding the experience of vulnerability called for a multidisciplinary approach to gain insight into the practical, social, moral, and political implications. A field survey was conducted in different neighbourhoods of Greater Lille in which careful attention was paid to age, family relations, and the relationship to housing and neighbourhoods. This project contributes to furthering our understanding of the difficulties and resources of individuals and social groups in times of crisis.

EVEREST – The experience of vulnerability during the COVID-19 pandemic: shifts in knowledge and solidarity. – Marion Carrel and Aline Chamahian (CeRIES) and Cécile Lavergne – Savoirs, textes, langage (Knowledge, Texts, and Language) research lab

"Shared Solidarity Initiatives"

The TARCO project observes and analyses socioeconomic experiments dubbed "shared solidarity initiatives" (initiatives solidaires en commun – ISC) in the Hauts-de-France region, basing its research on prior work on people confined to the margins of the working world. Drawing inspiration from self-management or new forms of collaboration, these initiatives, and especially the people who take part in them, experiment with different relationships to work and activity. This research aims to characterise these relationships from different perspectives: personal feelings, self-expression, politics, and the methods used by individuals to recreate group relationships when working alone as sole traders. This research also looks into the economic models of these new forms of entrepreneurship, which have developed sophisticated contribution/reward systems that involve members in evaluating their own work. These systems lead us to ask questions about the ways in which the value of work itself is evaluated, which are interwoven with the new forms of reciprocity that have been developed. The project's aim is to classify the overall economic model of an experimental ecosystem by revealing the network of interdependence that brings together a range of different forces, in order to help foster local economic growth.

TARCO – Work, Activity, and Reward in Shared Spaces (Travail, Activité et Rétribution dans les COmmuns) – Lille Centre for the Study and Research of Economics and Sociology (Clersé), UMR 8019

How can underprivileged individuals be included in the ecological transition?

Craig Thompson, Professor of Marketing at the Wisconsin School of Business and one of the pioneers in the study of the intersection between marketing and culture, has published articles on Consumer Culture Theory. His research focuses on the social and cultural construction of consumer identity, particularly on the role played by gender and social class dynamics in shaping this identity. As part of the PAUSE (Poverty and Sobriety) fellowship funded by I-SITE ULNE through the International Chairs of Excellence programme, Thompson is working with Hélène Gorge, an associate professor in management, along with an interdisciplinary research team from Lille, to study the issues surrounding the inclusion of underprivileged populations in the ecological transition. This chair aims to study the way in which everyone, including the most vulnerable among us, can be assisted in moving forward with the ecological transition. It studies the institutional policies that can encourage people who are already affected by different forms of constraints to include ecological sobriety in the ways they behave as consumers. It examines the way in which sobriety can be talked about and put into action at the individual and collective levels.

PAUSE – Poverty and Sobriety: Including the underprivileged in the ecological transition – Craig Thompson – Lille University Management Lab (LUMEN)

Interview

María Moreno,

Master's student in Biology and Health and intern at PreciDIAB

Where are you from and why did you come to Lille?

I am from Fuengirola, a village in the Malaga province of Southern Spain. Last year, I was in Madrid looking for an opportunity to pursue my research career abroad and I chose Lille for the quality of the educational offering here: a second-year Master's-level course of study in the "Precision Health" graduate programme paired with an internship in a leading laboratory (U1190, one of the three founding laboratories of the EGID, the European Genomic Institute for Diabetes) and in a field that I was particularly interested in, diabetes. I also received financial support from the "Precision Health" graduate programme to move to France. In addition, being integrated into an international team helped me hone my English skills and learn French at the same time.

Can you tell us about your academic background and your career objectives?

I studied biochemistry in Malaga, where I specialised in applied molecular biochemistry. Last year, I began an Applied Industrial Biotechnology Master's Degree at Complutense University of Madrid, which I am continuing to pursue remotely from France. My current aim is to continue my studies with a PhD from the University of Lille.

OFFERING A WORLD-CLASS **research-driven education**

Launched in September 2020, I-SITE ULNE's graduate programmes offer research-based education in the major scientific and societal research fields of the I-SITE, with a strong connection between Master's and PhD studies.

I-SITE ULNE's graduate programmes immerse students into a world-class scientific environment that enables them to acquire the key skills they need to overcome the interdisciplinary challenges at stake in their field.

The cornerstone of the EPI's overall strategy

Created by I-SITE ULNE as part of the construction of the Experimental Public Institution (EPI), these graduate programmes* aim to offer Master's and PhD students a research-based education in line with the strategic focus areas of the I-SITE. Each core research area at I-SITE ULNE (Precision health, Science for a changing planet, Human-friendly digital world, Changing cultures, societies and practices) has developed its own graduate programme, while fostering interdisciplinarity between the different programmes and within individual programmes themselves. The directors of I-SITE ULNE's hubs, graduate programmes, Master's programmes, doctoral schools, and the Doctoral College have all worked together to develop these new educational offerings. This encourages better interplay between different faculties, schools, and doctoral schools. The core principles that guide these new graduate programmes are harmonisation on shared strategic topics, interdisciplinarity, internationalisation, and professional integration. They are applied through interdisciplinary activities, joint seminars, and inaugural conferences that bring students together and present the challenges that need to be prioritised. Most of the courses are taught in English. Opportunities to study or conduct research abroad are made available along with financial support to do so. Three graduate programmes – "Precision health", "Innovation for a changing planet", and "Information and knowledge society" – began courses for their first class of Master's students in September 2020. The first PhD students will begin to study in these programmes in September 2021. A fourth graduate programme, "Changing cultures, societies, and practices", will be launched this autumn.

Increasing Lille's international appeal to open up to the world and showcase our research activities

Increasing the appeal of our educational offering among international students is a sure way to open ourselves up even more to the rest of the world. Providing support for study and research abroad opportunities also furthers this aim. These programmes will ensure that students are able to be at ease in a career in an international context. Graduate programmes run from the Master's level to the PhD, with help guiding Master's students toward their

Graduate Programmes Lille

Key figures

Precision health

Precision Health / Santé de précision

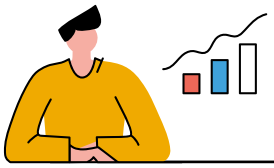
1
Master's degree in Biology and Health

18
Master's students

17%
international students

Tied to 2 Labexes:
EGID and DISTALZ

Specificities:
Teaching organised around seminars; an accelerated PhD track



future dissertation topic and funding opportunities. Master's students will also share course modules with PhD students, in addition to mentored research and summer schools, which will facilitate exchanges and make academic research careers more attractive. All of these aspects will contribute to furthering the international reputation of Lille's research activities and educational programmes. Through the particularly stimulating educational environment they offer, these graduate programmes – both at a Master's and a PhD level – will contribute to training students to approach transitions in an all-encompassing way, producing the leaders of tomorrow in academia, government, and business.

Science for a changing planet

Science for a Changing Planet / Innovation au service d'une planète en mutation

8
Master's degrees in Physics, Chemistry, Biology, and Earth Sciences

77
Master's students

63%
international students

Linked to 1 Labex:
CaPPA

Specificities:
Strong existing international appeal; Erasmus Mundus Joint Master's Degrees; course credit through classes that teach interdisciplinary skills

Since September 2020, in all graduate programmes:

- 27 graduate scholarships awarded
- 19 study abroad grants awarded

Information and knowledge society

Information and Knowledge Society / Société de l'information et de la connaissance

10
Master's Degrees in data science and artificial intelligence, the internet of things, electronics, photonics, mathematics, scientific computing, cognitive science, and philosophy

160
Master's students

25%
international students

Tied to 1 Labex:
CEMPI

Specificities:
substantial interdisciplinarity

Changing cultures, societies, practices

A fourth graduate programme, "Changing cultures, societies and practices", will be launched in the autumn of 2021.

* These graduate programmes are the organisational component of the Graduate Research And Education in Lille (GRAEL) project, which was the recipient of a national SFRI (Organising research-based education in Initiatives of Excellence) grant (part of the Investments for the Future Programme). The proposal was submitted in the spring of 2020, and the project was granted approval in the fall of 2020. This funding will be supplemented by I-SITE ULNE and its institutional partners such as the Lille European Metropolis (MEL) and the Hauts-de-France Regional Council.

TOGETHER IN THE **fight against COVID-19!**

In March 2020, I-SITE ULNE took action by creating a COVID-19 task force endowed with €2 million in funding from the Foundation. The first results are now coming in. This mobilisation solidified the organisation of the I-SITE's health research teams, who worked in concert with its researchers from other fields.

Faster testing

With support from the EU, the CorDial-S project aims to help curb the spread of the virus by developing fast, sensitive testing systems. Its concept is based on a combination of multiple technologies: an optical reader using a Surface Plasmon Resonance (SPR) method adapted for diagnostic use, paired with minuscule antibodies called "nanobodies" grafted to the surface of the optical device and magnetic particles to enhance the sensitivity of detection in saliva. From the outset, doctors from Lille University Hospital were brought on to assist with the project, reviewing the effectiveness of the concept using samples taken from different patients who had tested positive and negative. This helped guide the project and speed up the development process. CorDial-S now enables viral test results to be obtained within twenty minutes. Preclinical testing is currently under way and shows an 87% concordance with PCR testing. A clinical trial is planned in the coming weeks. **https://cordial-s.univ-lille.fr/**

3D printing for healthcare

In a time in which medical devices and Personal Protective Equipment (PPE) were in short supply due to the COVID crisis, the healthcare world joined forces with the Engineering Sciences to offer alternatives with the pharmacists and doctors of Lille University Hospital. This was made possible through 3D Printing. The investments made by I-SITE ULNE in the context of this health crisis enabled this research to get off the ground. This project is the first step toward the development of a 3DP platform that will allow engineering scientists to contribute healthcare through the emergence of custom-tailored medical devices that may one day come to revolutionise hospital care.

LICORNE: A clinical and biological data bank for researchers

Within the context of the research projects being funded by I-SITE ULNE through the COVID-19 task force, it became necessary to optimise access to the clinical and biological data of COVID-19 patients. The Lille COVID Research Network (LICORNE), coordinated by an interdisciplinary scientific committee, centralises data from nearly 800 patients. Among the first publications, Professor Susen's team showed the dangers associated with vascular endothelial dysfunction and coagulation disorders. Working with an international team, Professors Pattou and Jourdain showed the impact of obesity on the severity of COVID-19. The work of Professor Quesnel's team revealed that the development of Clonal Haematopoiesis can be an advance warning sign of subsequent chronic inflammation. In addition to these early results, much research is currently under way, and still more is yet to come. LICORNE provides data to over 25 research projects on the Lille campus, and remains open to national and international cooperation on projects.

The patient care experience for vulnerable populations during a pandemic

The care received by vulnerable populations was put to the test during the COVID-19 pandemic, revealing issues

with patient management, fostering an environment of psychological stress, and reviving ethical questions associated with healthcare procedures and the social and societal issues related to the nature of the pandemic. Some groups were hit harder than others, such as the elderly, healthcare professionals, and informal and professional caregivers. The aim of the European COVERAGE network is to analyse and compare the impact of the response to the pandemic in Europe on vulnerable populations, particularly the elderly, through an interdisciplinary holistic approach: the patient care experience. COVERAGE brings together partners from Canada and seven EU nations from a Europe-wide consortium built around the European university project InclusU.

European COVERAGE network – Jean-Baptiste Beuscart – Lille University Hospital, ULR 2694 METRICS

How did the epidemic transform prisons?

Through an interdisciplinary approach combining sociologists, anthropologists, legal scholars, criminologists, psychiatrists, and philosophers, the CONTAGION project, coordinated by Gilles Chantraine of the Lille Centre for Sociological and Economic Research and Studies (Clersé), is working to lay the groundwork for a broad assessment of COVID-19's impact on prisons in France. The project will conduct a systematic analysis of different facets of this crucial social issue, whether in terms of politics and criminal law (social tension, changes in the flows of arriving/released inmates), organisation (day-to-day life, prison rules, the relationship between the work of different professionals), or inmates' experience (adaptation and social acceptance of COVID measures, impact on physical and mental health, ties with the outside world, etc.).

Gilles Chantraine, Lille Centre for Sociological and Economic Research and Studies (Clersé)

Optimising vaccination strategies

Vaccination is a key priority for curbing the pandemic. The oldest and most fragile patients were the first to be given access to vaccination. Yet this high-risk population is often less well protected by vaccines due to the ageing of their immune systems, and they are not specifically represented in clinical trials. This is why, with support from I-SITE ULNE, Lille University Hospital, Institut Pasteur de Lille, and the University of Lille launched the MONITOCOV-AGING study, which was named as a "National Research Priority". This prospective study compares the efficacy of the Pfizer/BioNTech vaccine among residents of the Les Bateliers nursing home in Lille as compared to a control group made up of healthcare workers between ages 18 and 65. Levels of specific neutralising antibodies and T cells were assessed in over 100 test subjects in each group. The initial results will be released before this summer and along with the additional data collected early this winter, will make it possible to determine appropriate vaccination strategies, such as annual booster shots or a three-dose vaccination schedule.

"The I-SITE's contributions to COVID research efforts and the involvement of its members in the COVID task force are emblematic of the momentum created around health issues."

Benoît Vallet,
Director of the Regional Health Agency

"The partnership between the task force and our scholarly society enabled us to provide the general public with rich and scientifically accurate information."

Michel Levasseur,
President of the Lille Society of the Sciences, Agriculture and the Arts

Together in the fight against COVID-19

The COVID-19 Research Task Force brought together some of Lille's top researchers for a series of online conferences on the pandemic, in association with the Lille Society of the Sciences, Agriculture and the Arts. In all, 27 "general public" conferences are now available on the task force's YouTube channel, each of which falls into one of four themes:

1 ⊙→ The virus and the body's immune response
2 ⊙→ Clinical presentation and care for COVID-19 patients
3 ⊙→ Long-term complications and their impact
4 ⊙→ The different therapeutic approaches being studied, including vaccines

This initial series was supplemented by an additional series (21 videos) centred on social and political perspectives in which the complexity of the impact of the crisis on our society is explained.

OVERALL ALLOCATION
of funding

The I-SITE ULNE Foundation oversees the grant money directly allocated to support the "Initiative of Excellence" project and further the aims of projects in the Investments for the Future Programme hosted by the I-SITE ULNE consortium.

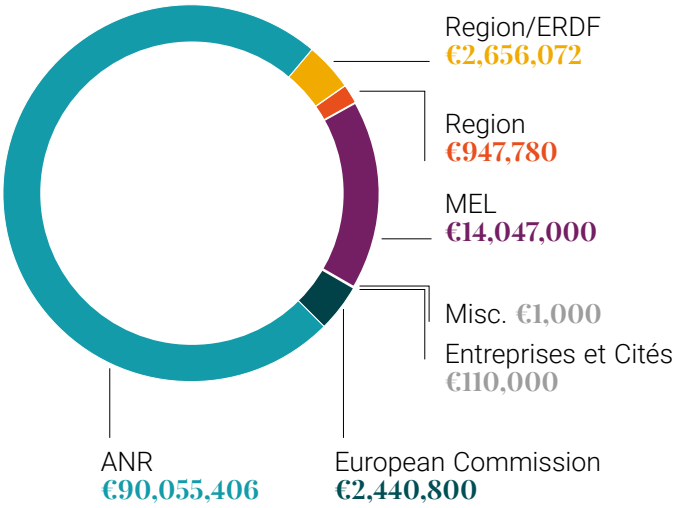
Funding*:

- Funding from the French National Research Agency (ANR) allocated for Science, Innovation, Territory, and Economy Initiatives (I-SITEs). This includes the share of funding allocated to four Lille Labexes (CAPPA, CEMPI, DISTALZ, and EGID).
- ANR funding for the PreciDIAB National Center for Precision Medicine (CNMP).
- Direct grants from the Regional Council and the MEL awarded for the I-SITE and the National Center for Precision Medicine (CNMP). (Particularly PreciDIAB.)
- More recently, the ANR grant money for SFRI (Organising research-based education in Initiatives of Excellence) calls for proposals and the "Graduate Research And Education in Lille" (GRAEL) project.
- If the I-SITE status is confirmed in 2022, funding for the IdEx and I-SITE Integration and Development (IDéES) call for proposals and the WILL (Welcoming InternationaLs in Lille) project.

* It should be noted that over the same period, in addition to the funding it allocated to the I-SITE, the Hauts-de-France Regional Council also granted a total of €159 million in funding to individual members of the consortium through a number of programmes.

This funding, which represents a total of €110 million over the trial period, is divided as follows:

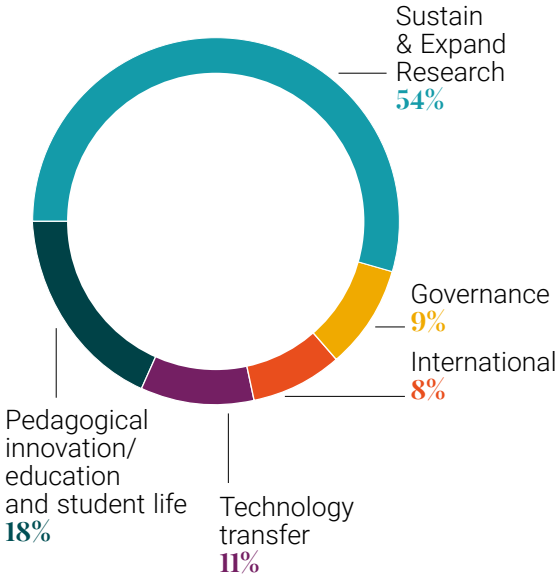
Funding overseen by the I-SITE ULNE Foundation



Funding allocation

This funding, excluding funding contractually earmarked for Labexes and PreciDIAB, was allocated on a commitment accounting basis as follows (data from the end of the 2020 financial year):

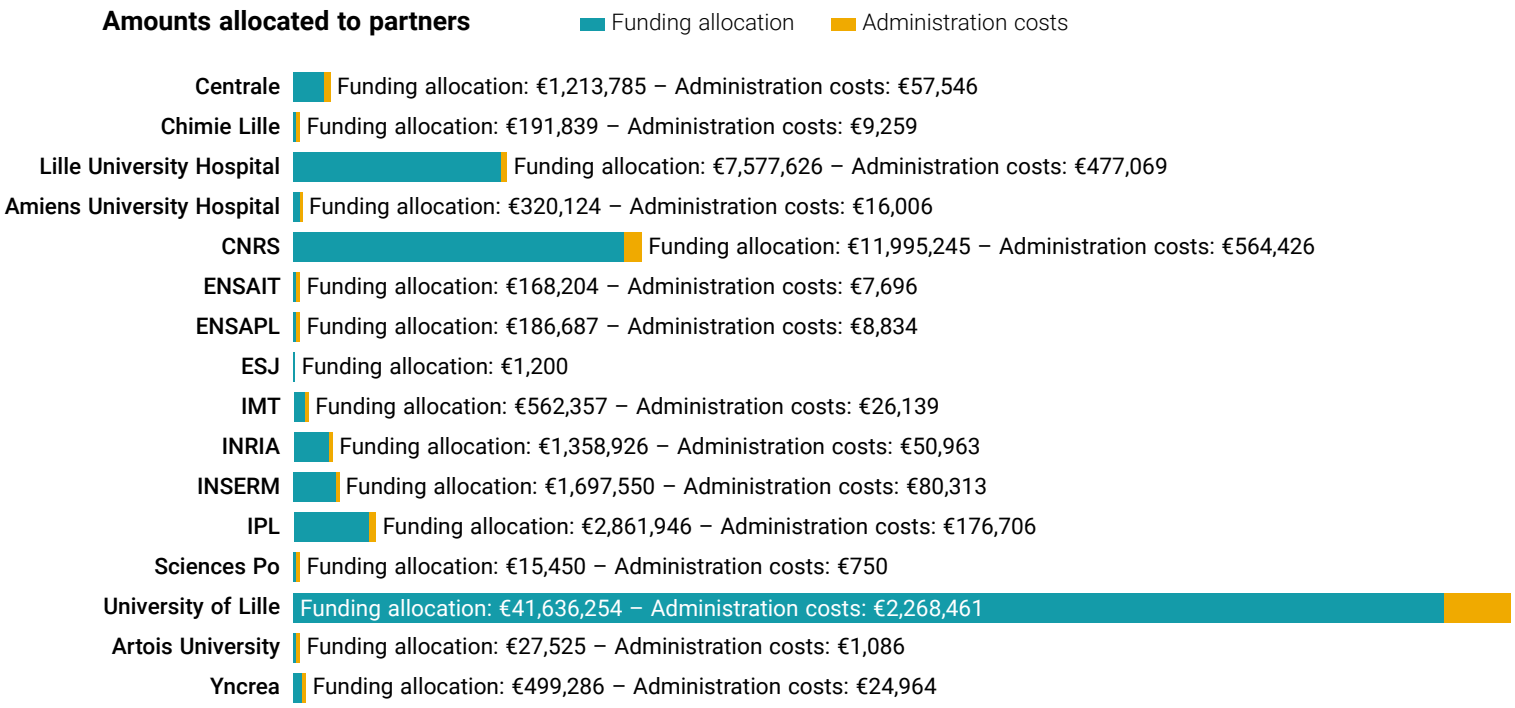
Nature of commitments, excluding funding earmarked for Labexes and PreciDIAB



Division of resources between member institutions

The vast majority of funding is redistributed to consortium members via funding agreements.
A very modest amount of funding takes the form of direct purchases made by the I-SITE, either for its own in-house operations and salaries or for certain service providers (approx. €1 million) such as Clarivates (journal citation data) or the subscription to "The Conversation" (a media outlet) on behalf of the entire consortium.

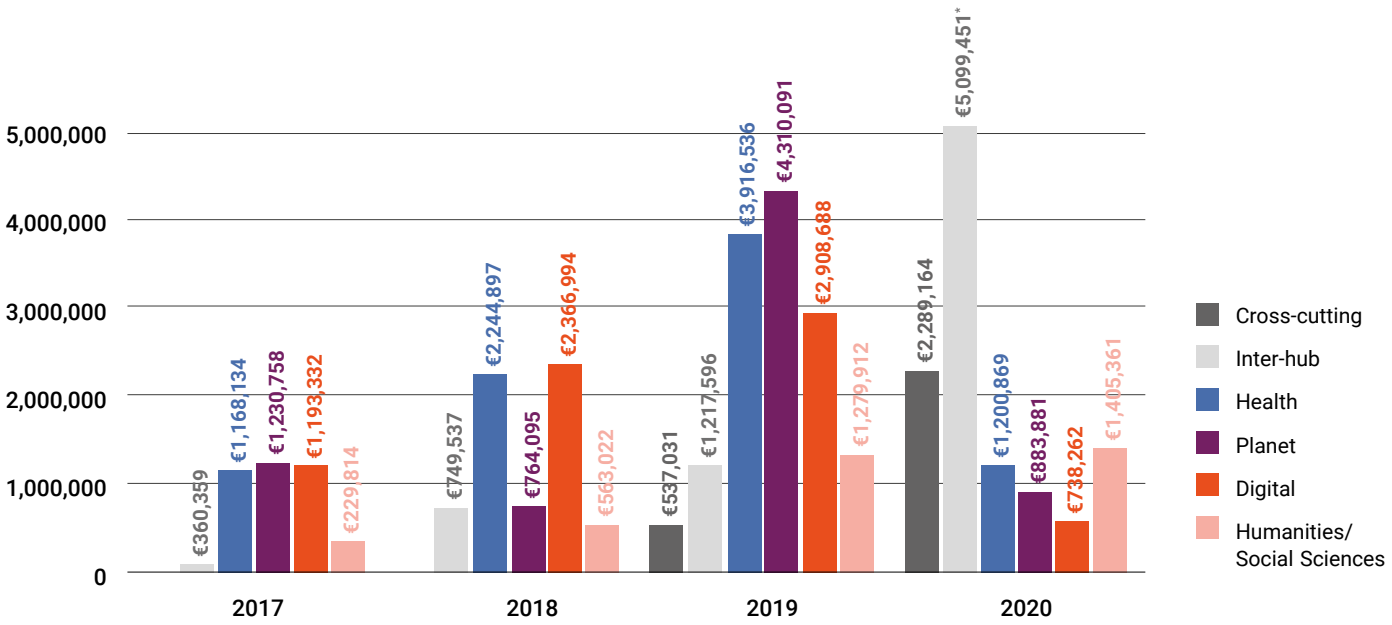
As of 31 May 2021, commitments for disbursements from I-SITE funds represents:



Administration costs: ANR rules state that an allowance for general administration costs is granted to institutions to allow them, in particular, to enhance support for the scientific activities they undertake. This allowance is fixed. Pursuant to a vote by the consortium members, it is divided among the members at a rate of 3% each for all eligible expenses (excluding general expenditures) for the I-SITE and 5% for institutions receiving grant assistance. The graph above shows the share that goes to each member. As an exception, on certain transactions, the I-SITE does not collect the allowance for administration costs.

Division of funding by discipline

The resources allocated via funding agreements can be broken down into themes as follows (excluding Labexes and PreciDIAB). In 2019, our funding gave greater incentive to pursue interdisciplinarity, which can be seen in the growing share of inter-hub projects. In 2020, even if the proportion is relatively small, the Steering Committee sought to fund projects explicitly involving several institutions from the future EPI.



"Inter-hub" projects refer to multidisciplinary or interdisciplinary projects that cover at least two hubs, thought it should be noted that the hubs are already inherently interdisciplinary. "Cross-cutting" projects refer to those that by their very nature cover all the site's fields and institutions.

*Includes 2 million euros for the COVID task force in 2020

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