



ÉTS PLORE MISSION

INTERNATIONAL STUDENT
MISSION FOR COLLABORATION
AND NETWORKING IN
ENGINEERING AT ÉTS

—
2025 EDITION – ITALY
APRIL 25 TO MAY 10

MISSION
REPORT

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NEXT EDITION



TEAM MESSAGE

It is with immense pride that we turn the page on this remarkable chapter, the 2025 edition of the Mission ÉTSplore in Italy. This experience was far more than an international journey; it was an immersion into the heart of Italy's technological ecosystem, driven by excellence, innovation, and passion.

Through our visits to companies and universities, we had the privilege of meeting leaders in Italian engineering and engaging with researchers and students dedicated to advancing their respective fields. This mission offered us a renewed perspective on our professional futures in engineering while strengthening our human skills, teamwork, and intellectual curiosity.

Beyond the technical learning, the experience was profoundly human. Over the past ten months, we have shared meaningful moments and overcome logistical, interpersonal, and organizational challenges together as a team. These collective efforts fostered strong bonds and genuine cohesion, enabling us to successfully bring this 2025 edition to life.

While this chapter comes to a close, our journey continues. We are already working diligently on the next edition, driven by the same passion to share our discoveries, expand our network, and pass on our insights to the broader community.

Italy has inspired us, not only through its engineering excellence, but also through its culture, its people, and its vision of innovation, arrivederci !



ACKNOWLEDGEMENTS

Once again, the members of the team have succeeded in turning their vision into reality by organizing impactful visits within prestigious organizations. These ambitious goals were brought to life thanks to the invaluable contribution of our partners. Through these few lines, we wish to express our deepest gratitude to the organizations that actively support the personal and professional growth of students from the École de technologie supérieure (ÉTS).

These acknowledgements must begin by recognizing the unwavering support of the Québec Delegation in Italy, and in particular the continuous guidance of Dr. Ralph Christian Maloumby Baka, Attaché for Research and Innovation. Our many insightful exchanges with Ralph were instrumental in ensuring the success of the 2025 edition. His support, availability, and deep understanding of the Italian ecosystem—along with the entire team at the Québec Delegation in Italy—greatly contributed to the success of our visits and strengthened our collaborations with Italy.



Next, the Mission ÉTSplore wishes to extend its heartfelt thanks to ÉTS, its Student Clubs Administration, and the Student Life Services. Their invaluable support throughout the 2025 edition enabled the members to overcome numerous logistical and organizational challenges with success.

We would also like to express our gratitude to Michel Huneault, Director of Academic Affairs at ÉTS, and Fortunato Mangiola, Commercial Consul of Italy in Montréal, for their respective speeches during our launch evening on April 10, 2025.

Our sincere thanks also go to our Diamond Partners for their generous contributions. We wish to begin by acknowledging Les Manifestes, and in particular Éric Léger, for the coordination and creation of our brand-new website.

The Mission ÉTSplore would also like to thank the ÉTS Alumni and Philanthropy Office, Genium360, and the ÉTS Student Association (AÉÉTS). Their outstanding financial support played a vital role in bringing this edition to life. We cannot emphasize enough how essential our partners are — a project of such scale could never be achieved without their continued trust and collaboration. Grazie a tutti!



OUR PROJECT

Every year since 2012, Mission ÉTSplore has offered a group of ten highly motivated students the opportunity to embark on an exciting international journey. The selected participants stand out for their keen interest in the global dimension of engineering, as well as in the roles and responsibilities engineers hold within society. During a two-week stay in the host country, members visit leading organizations and discover diverse approaches to the engineering profession, while developing innovative ideas that contribute to the advancement of Québec society.



West Coast 2018



Italy 2025

These visits also aim to allow members to discover and draw inspiration from various models of technology, management, entrepreneurship, and innovation, enabling them to develop professional profiles that stand out from their peers. In other words, Mission ÉTSplore provides future engineers with the opportunity to strengthen their professionalism, open-mindedness, and ability to work effectively as part of a team.

Since 2012, ÉTSplore mission is :

Institutions Visited

168

Students Selected

147

Cumulative Partners

72

Countries Visited

12

Completed Editions

12

OUR 2025 PARTNERS

DIAMOND



**DIPLÔMÉS
ET PHILANTHROPIE**
Secrétariat général
Engagement organisationnel



GOLD



STAGES ÉTS
Apprentissage intégré au travail

SILVER



2025 TEAM



Ailish Troughton

Bachelor's Degree in Mechanical Engineering



Kelly-Ann Doucet

Bachelor's Degree in Mechanical Engineering



Roma Des Ruisseaux

Bachelor's Degree in Software Engineering



Khaoula Tahri Squalli Houssaini

Bachelor's Degree in Software Engineering



Hana Khereba

Bachelor's Degree in Software Engineering



Antoine Marchand

Bachelor's Degree in Electrical Engineering



Tommy Parent

Bachelor's Degree in Software Engineering



Florent Le Gac

Bachelor's Degree in Construction Engineering



Ayoub Oukal

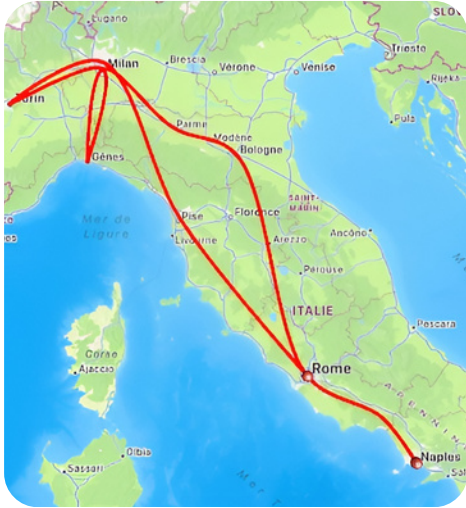
Bachelor's Degree in Software Engineering



Vincent Chouinard

Bachelor's Degree in Construction Engineering

ITINERARY AND ORGANIZATIONS VISITED



The journey began in Turin and Milan, where the members took advantage of two public holidays to explore Milan, its Sforza Castle, and the iconic Duomo Cathedral. The next stop was Genoa, where the narrow alleyways (known as “carruggi”) intertwine the city’s technological hubs with its rich maritime heritage. The team then traveled to Emilia-Romagna, also known as the “Motor Valley”, renowned for its centers of innovation and automotive design.

In Rome, the members had the opportunity to witness how a millennia-old history can coexist with innovation, notably during their visit to La Sapienza University. Finally, in Naples, they discovered the San Giovanni campus of the University of Naples Federico II, a technological hub offering a breathtaking view of Mount Vesuvius.

By the end of this two-week journey, the members had visited a total of thirteen organizations, covering a wide range of fields such as transportation, aerospace, environment, and software engineering.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
April 27, 2025	April 28, 2025	April 29, 2025	April 30, 2025	May 1, 2025 (Public Holiday)	May 2, 2025 (Public Holiday)	May 3, 2025
Milan	Turin/Milan	Genoa	Milan	Milan	Milan	Bologne
 Travel from Rome to Milan	 	 	 POLITECNICO MILANO 1863	 Visit of the Milan Cathedral	 Visit to Lake Garda (Lago di Garda)	 Free time
May 4, 2025	May 5, 2025	May 6, 2025	May 7, 2025	May 8, 2025	May 9, 2025	May 10, 2025
Ravenna	Parme	Bologne	Rome	Rome	Naples	Rome
 Visit to the National Museum of Ravenna		  	 SAPIENZA UNIVERSITÀ DI ROMA		 	 Return to Montreal



For its first visit, Mission ÉTSplore started strong with a tour of Alfa Romeo, an Italian automobile manufacturer and subsidiary of the Stellantis Group, which employs nearly 300,000 people worldwide.

The main goal of this visit was to learn more about the production of Alfa Romeo's new hypercar, the 33 Stradale. The story behind this hypercar began with a small, passionate team within Alfa Romeo, including Cristiano Fiorio, former head of the Alfa Romeo Formula 1 team. Their idea was simple yet ambitious: to develop a new hypercar inspired by one of the brand's most iconic models, the original 33 Stradale. This legendary car from the late 1960s and early 1970s could reach 100 km/h in just 5.5 seconds, an impressive feat for its time. Only 18 units were ever produced between 1967 and 1969.



Source de l'image : <https://www.carsup.io/blog/alfa-romeo-33-stradale---renaissance-dune-legende>

The team's vision was clear: to preserve the DNA of the original 1970s model while elevating it through the technological innovations of our time. This DNA is reflected in the car's exterior aesthetics, its emotional connection with the driver, and the pure driving pleasure it delivers.

To successfully bring this project to life, the team had to adopt a true "start-up mindset," as doubts and some reluctance were initially felt within the group's management. To secure executive support, Cristiano Fiorio's team first needed to identify potential clients. In order to maintain a strong connection with Alfa Romeo's heritage, the team decided that only 33 units of the car would be produced, ensuring exclusivity for future owners. To find these clients, the team travelled across the world, presenting their project to various collectors and private buyers. Within just a few months, the response exceeded expectations, 50 potential clients expressed interest. Since only 33 would ultimately have the privilege of owning the vehicle, the team faced the challenge of making some difficult choices.

For vehicles of this kind, the Alfa Romeo team did not rely on a "first come, first served" approach, far from it. They wanted to ensure that each potential buyer had a genuine passion for the brand, as their guiding principle was clear: "money can't buy experience."



Source de l'image : <https://www.carsup.io/blog/alfa-romeo-33-stradale---renaissance-dune-legende>

After confirming its clients, the project team was finally able to begin the official design phase of the hypercar, drawing in particular on the constructive feedback gathered from the individuals who had reviewed the model's initial sketches.

Even during this stage, the clients developed a deep personal connection with their car and became part of the extended Alfa Romeo family. Given the wide range of possible configurations, each client designed their own vehicle in close collaboration with Alfa Romeo's teams. They could customize various elements of their car, including the logo, headlights, interior, color, wheels, and many more details, to create a truly unique masterpiece.

Once the design phase was completed, the team began production of the 33 models for their clients in 2023. It takes approximately six months to manufacture this hypercar, capable of reaching a top speed of 333 km/h, powered by a 3.0-liter twin-turbo V6 engine delivering 620 horsepower, a true masterpiece of engineering!



Source de l'image : <https://www.carsup.io/blog/alfa-romeo-33-stradale---renaissance-dune-legende>

After producing a portion of the models, some clients had the opportunity to test the vehicle. One of them was none other than Valtteri Bottas, a former Formula 1 driver who raced for several teams, including Alfa Romeo. During his test session at the Balocco circuit in Italy, Bottas provided the on-site engineers with numerous valuable insights drawn from his professional racing experience, helping them further refine the settings and performance of this exceptional vehicle.



Source de l'image : <https://www.carsup.io/blog/alfa-romeo-33-stradale---renaissance-dune-legende>

Just like Alfa Romeo's clients, the members of Mission ÉTSplore had the privilege of attending a simulated client-manufacturer experience, featuring an exclusive unveiling of the exhibition model of the 33 Stradale. They also took part in a mock vehicle configuration session, stepping into the role of potential buyers to experience firsthand the personalized design process offered to clients.

Some members even had the honor of sitting inside the cabin of this exceptional hypercar, getting a firsthand glimpse of the pure driving pleasure this vehicle is designed to deliver!

To conclude its first day of visits, Mission ÉTSplore had the privilege of touring WSP Italia at their newly renovated Milan offices. The renovation project was designed to achieve LEED Platinum certification, an environmental initiative that aligns perfectly with WSP's position as a global leader in engineering and environmental consulting services. The purpose of this visit was to explore the wide range of WSP's areas of expertise, particularly in the generation, transmission, and distribution of renewable energy. It is worth noting that WSP places strong emphasis on environmental protection, health and safety, quality assurance, and project management.

The visit began with an introduction to WSP by Sergio Settanni, Managing Director for Southern Europe and Italy at WSP Central Europe. Then, Alessandro Fata, Director of WSP Power & Energy Italy, presented the company's Power & Energy sector, accompanied by his colleagues Federico Cascavilla, Nithin Siddharth Babu, and Paolo Sammartino.

These engaging discussions allowed the members to gain deeper insight into the key challenges of the energy transition, including the reduction of greenhouse gas emissions, the security of energy supply, and the development of clean technologies.

Un exemple concret de ce développement propre est l'hydrogène vert. En effet, l'hydrogène vert est produit à partir d'énergie solaire, par un procédé appelé électrolyse. L'électricité collectée alimente des électrolyseurs qui séparent ensuite l'eau en hydrogène et en oxygène. Par après, l'hydrogène est compressé à 300 bars puis stocké afin d'être utilisé comme carburant propre.



This process, implemented in the Brindisi (2.5 MW) and Bastardo (2 MW) projects for Enel Green Power, represents a sustainable alternative to fossil fuels and contributes to the reduction of greenhouse gas emissions.

The session continued with a presentation from Recurrent Energy, (a subsidiary of Canadian Solar), led by Bruno Leonardo Colonese and Roberto Grigoletto, who introduced their projects and the related technical challenges. A representative example discussed was the BESS (Battery Energy Storage System) technology, with projects such as Maddaloni (200 MW) and Assemini (39.7 MW), presented as key solutions for stabilizing the electrical grid.

It is important to note that these systems allow for the storage of surplus electricity generated from renewable sources for later use, particularly during periods of irregular production. These innovative systems are designed to address the challenges of reliability and accessibility in green energy.

The team also discovered the concept of AgroPV, presented by Ricardo Jesus Hernandez, which combines solar energy production and agriculture on the same land, thereby reducing land-use impact. This ingenious system allows plants to capture dust that might otherwise settle on the panels and reduce their efficiency, while also helping to cool the air beneath them. In turn, the panels protect the crops from excessive sunlight exposure. This model makes it possible to produce energy while preserving agricultural activity — addressing both biodiversity and land-use concerns. This presentation was particularly relevant, as WSP is currently involved in developing 1.5 GW through PV/AgroPV projects.

Before moving on to WSP's wind energy projects, Marco Giuseppe Clerici presented a case study illustrating the role of the Owner's Engineer. Members participated in a hands-on interactive exercise that simulated a real-life consulting scenario. This activity highlighted the importance of clear communication and early definition of client needs to ensure the success of any project.

To conclude the visit, the team learned about a portion of WSP's 4 GW of onshore and offshore wind projects, including Odra (1,325 MW) and Kailia (1,170 MW). These projects aim to install offshore wind turbines to harness marine winds and produce electricity on a large scale. Such complex projects require extensive technical and environmental studies to minimize impacts on seabeds. Offshore wind developments thus make it possible to generate significant amounts of renewable energy without encroaching on agricultural land, all while preserving marine ecosystems.



All these presentations from WSP's professionals allowed the members to gain a deeper understanding of the challenges and issues related to the energy transition and the innovations that accompany it. Through the combination of engineering, innovation, and sustainability, the members discovered tangible solutions to address today's climate challenges.



On Tuesday, April 29, the Mission ÉTSplore team had the honor of visiting Leonardo's facilities in Genoa, an international leader in the fields of aerospace, defense, and security. This visit took place within the framework of a tripartite memorandum of understanding between Leonardo, the University of Genoa, and the Université du Québec en Outaouais (UQO), an agreement aimed at strengthening collaboration in applied research and technological innovation.

The team was welcomed by Dr. Alessandro Garibbo, Head of University and Research Center Relations, who guided the members through the company's various divisions. Following formal introductions, Roma Des Ruisseaux, a member of Mission ÉTSplore, had the honor of presenting the École de technologie supérieure (ÉTS), its programs and internship opportunities, to an audience including Luc Pénaud, Honorary Consul of France in Genoa, Dr. Ralph Maloumby Baka, Research and Innovation Attaché at the Québec Delegation in Italy, Dr. Alessandro Garibbo, and students from the University of Genoa.

After this presentation, the team began their tour in the robotics laboratory, where a quadruped robot is being developed for search and rescue operations in hazardous environments, such as during fires or natural disasters. This robot can move across uneven terrain, avoid obstacles, and generate 3D maps of building interiors to assist in rescue missions. Technologies integrated into these robots, including LIDAR, enhance route planning, improve coordination with emergency teams, and support the detection of victims or high-risk areas.



The visit continued with the discovery of the Davinci-1 supercomputer, comprising over 200 servers, 10,000 GPUs, and 20 million gigabytes of memory. This infrastructure enables Leonardo to perform massive computational tasks, reaching more than 5 quadrillion operations per second, a true technological marvel! All this computing power is harnessed to accelerate digital prototyping and the simulation of complex aerospace systems, significantly reducing development time and enhancing precision in engineering design.

After that, the members headed to the research department, where they met master's and Ph.D. students conducting their academic projects in collaboration with Leonardo.

The members were introduced to several research projects, starting with CFD simulations (Computational Fluid Dynamics), used to optimize the integration of a hemispherical radar (RADALT) beneath a specific type of aircraft. Leveraging the power of the Davinci-1 supercomputer, the student was able to analyze the aerodynamic impact of adding this radar and determine the optimal placement to minimize drag coefficient.

Other projects focused on CGF (Computer Generated Forces) — virtual entities used in flight simulation environments to represent allied, enemy, or neutral forces. The research centered on developing autonomous CGF behaviors capable of reacting intelligently to a pilot's or operator's actions within a simulation, using artificial intelligence. These CGFs make virtual training environments more realistic and dynamic for pilots.

The final project highlighted research in quantum computing, an emerging field within Leonardo. The members received a clear explanation of the difference between a classical bit, which can be either 0 or 1, and a quantum bit (qubit), which can represent both states simultaneously. To illustrate this concept, the student compared the qubit to two clock hands rotating around a circle, demonstrating that it can occupy multiple states at once. Qubits have the potential to perform complex calculations far more rapidly than conventional computers.

The visit concluded in a demonstration room showcasing Leonardo's capabilities in managing IoT devices within urban and mobile environments. This facility illustrates how Leonardo can monitor sensors in real time, whether on a single bus or across an entire city. The system integrates microphones for ambient sound monitoring, cameras for facial recognition, and speakers for direct communication with individuals on site. The room is also equipped with computers capable of automatically identifying and flagging wanted faces!



This visit to Leonardo allowed the members of Mission ÉTSplore to immerse themselves in the heart of Italian technological innovation, discovering how Leonardo fosters a culture of innovation to achieve excellence in aerospace.

On the afternoon of April 29, Mission ÉTSplore had the pleasure of visiting Esaote, a company specializing in medical imaging and healthcare technologies. Founded in 1982 in Genoa, the company now employs more than 1,300 people and offers its solutions in over 100 countries through its numerous subsidiaries. The purpose of this visit was to explore Esaote's innovations in Magnetic Resonance Imaging (MRI) and ultrasound technologies. The members were welcomed with an introduction from Franco Fontana, Chief Executive Officer; Mariangela Dellepiane, Head of Internal Communications and International Relations; and Gianluca Dardato, Head of Human Resources.

This presentation allowed the members to better understand the company's philosophy: designing high-performance imaging systems that are also adapted to the physical and psychological needs of patients. Indeed, Esaote places patient well-being at the heart of its mission, offering ergonomic and accessible imaging solutions.



The visit continued in the Research & Development offices, where the members explored the software programming and design facilities. There, engineers develop image processing algorithms as well as the electronic components used in MRI and ultrasound systems.

During the discussions, the members learned how image acquisition chains are optimized to reduce examination time, improve accuracy, and minimize energy consumption. This optimization relies in part on the management of k-space, a concept that can be simplified as a mathematical matrix used to store the raw data collected during an MRI scan.

Thanks to calculations based on the Fourier transform, this data is then converted into the final image. By optimizing the management of k-space and improving how data is collected and reconstructed, Esaote's machines are able to produce sharper images in less time!



Continuing in the spirit of innovation, Esaote offers a technology called e-SPADES, which integrates two artificial intelligence–based algorithms. These two solutions, Hyper Speed and Hyper Clarity, respectively enhance image acquisition speed and image sharpness.

After visiting the offices, the members proceeded to the MRI production plant, where they discovered the manufacturing process of MRI systems, from the assembly of the main magnet to the installation of the electronic and software systems.



While exploring the various models, including the G-scan Open, the members noted the particular attention Esaote gives to the patient experience. The G-scan Open is designed to be more open and spacious than conventional MRI machines, providing greater comfort and reducing the feeling of confinement during examinations.

This design allows claustrophobic patients or those with higher body weight to undergo scans in a more accessible and comfortable way. Afterward, Giacomo Pedretti, Global Marketing Manager for Human and Veterinary Divisions, presented to the members the features of the G-scan Open, an innovative MRI system capable of tilting into an upright position. But the question remains: is this truly relevant?

Absolutely! Unlike traditional MRI systems that require patients to lie down, the G-scan Open allows for weight-bearing examinations, meaning scans can be performed under the patient's real physiological conditions. This feature enables more accurate diagnoses of skeletal pathologies and spinal, knee, hip, and ankle issues.



Esaote is also developing specialized MRI systems for athletes, such as the O-Scan, a compact MRI device dedicated to imaging the lower limbs for diagnosing sprains, ligament injuries, or fractures. This portable system is so effective that it was used by the Argentine national soccer team during the 2014 World Cup! Through this visit, the members gained a deeper understanding of the challenges of medical imaging and discovered how innovation, healthcare, and engineering can intertwine to enhance the quality of diagnostic examinations for healthcare professionals around the world.



On April 30, the ÉTSplore Mission team had the honor of spending an entire day at the Politecnico di Milano, one of the most prestigious universities in Europe. Founded in 1863, Politecnico di Milano, also known as POLIMI, is internationally renowned for its programs in engineering, design, and architecture.

Ranked among the best universities in the world each year by the QS World University Rankings by Subject, Gianluca Valenti and Mauro Filippini emphasize that POLIMI stands out for its hands-on approach to teaching and its strong international focus. Thanks to its programs and especially its master's degrees offered in English, POLIMI hosts no fewer than 48,000 students, 30% of whom are international. This entire community works together to produce around 5,000 research projects annually — 72% related to mechanical competitions, 25% to the automotive sector, and 3% to aerospace.



To begin the visit, the members attended several presentations on sustainable mobility, where professors shared their expertise in areas such as sustainable transportation, transport planning, and vehicle connectivity.

The visit continued with detailed tours of two major student clubs at POLIMI: the Formula SAE team "DynamiΣ PRC" and the motorcycle club "Polimi Motorcycle Factory" (PMF). Accompanied by students from both clubs, the visitors learned more about the innovations each team has developed.

To begin, the DynamiΣ PRC team designs electric and autonomous single-seater prototypes, allowing them to compete in several competitions each year. Their latest prototype, featuring a carbon fiber monocoque frame, weighs only 209 kg. What truly sets the DynamiΣ PRC team apart is its ability to innovate, particularly through the reuse of previous years' prototypes. In fact, to ensure continuous driver training, the students of DynamiΣ PRC transformed an old prototype into a racing simulator.

As for the motorcycle club, the PMF members design not just one, but two prototypes per year — one gasoline-powered and another fully electric. For the MotoStudent competition, each participating student team receives a 250 cc four-stroke engine, a set of tires, and a braking system for their gasoline prototype.



Everything else on the motorcycle, according to the official regulations, is entirely the responsibility of the students. Knowing this, they must demonstrate innovation to optimize all the remaining parts of the bike such as the chassis, suspension, exhaust, electronics, and more.

And in this context, the PMF club excels. The students bring key innovations such as the automatic deployment of a side flap when the rider brakes in a straight line to reduce braking distances.

After that, the team visited the aerodynamic wind tunnel, which consists of two test chambers: one standard for scale models and another for full-size models, designed in particular for aerodynamic tests with professional cyclists. Why place a cyclist in a wind tunnel? To optimize the performance of athletes preparing for the Olympics by analyzing, for example, the impact of posture and positioning on airflow.

The members also explored the urban driving simulation laboratory, which is used to study the impact of cognitive distractions such as phones or complex dashboards on road safety.



The visit concluded with “Team Green Mecc,” a student club designing an ultra-low-consumption electric vehicle that competes in the Shell Eco-marathon. Their next challenge? To develop a hydrogen-powered prototype to push the limits of their vehicle’s range and sustainability.

On May 5, the ÉTSplore Mission had the opportunity to visit the headquarters of Dallara Automobili, a world-renowned company in the competitive motorsport industry since 1972. As the official chassis supplier for IndyCar, Formula 2, Formula 3, and Super Formula, Dallara embodies excellence in performance engineering and technological innovation.

Welcomed by Prisca Montali, the members began with a tour of the Dallara Academy, an educational space inaugurated in 2018 that features an exhibition of the company's most iconic cars. From the Lamborghini Miura (1966) to Gilles Villeneuve's Wolf Dallara (1977), the Dallara F188 (1988), and finally the Cadillac DPi-V.R that won the 24 Hours of Daytona with Fernando Alonso in 2019, the members were able to admire a dozen exceptional vehicles



Next, during the tour of the technical facilities, the team learned more about the chassis production processes, aerodynamic optimization methods, and the racing simulator. Dallara designs its own chassis, which are made entirely of carbon fiber, an ultralight and rigid composite material used to optimize the weight to strength ratio of the vehicles. To achieve this, the company operates its own autoclaves and carries out all stages of production on site, from CAD design and CNC machining to final assembly.

Regarding aerodynamics, Dallara's core area of expertise, this component is tested through CFD simulations (Computational Fluid Dynamics), which are numerical methods used to study the behavior of fluids, both liquids and gases, around an object, as well as through physical wind tunnel testing. Each part of the vehicle is optimized to maximize downforce while minimizing drag, taking into account the specific constraints of each racing discipline such as IndyCar, F1, or F2.

It is worth noting that CFD technologies are advancing so rapidly that, according to Dallara, wind tunnel testing may become obsolete in the coming years, as it has reached a technological plateau. For some projects, Dallara no longer even produces scale models, as engineers now rely entirely on CFD simulations.

The members also had the privilege of visiting the racing simulator and witnessing an actual driving test. These simulator sessions, reserved exclusively for drivers and requiring prior medical approval, are used both for car development and driver training. The simulations are so realistic that drivers must wear their full safety gear during the sessions. The simulator can reproduce the vehicle's kinematics and dynamics, track vibrations, and even lateral forces reaching up to 4 g, which is four times the driver's body weight.



To conclude the visit, Andrea Vecchi, Director of Marketing and Communications, gave a detailed presentation on Dallara's commercial products and its typical clientele, which includes racing teams, manufacturers, and academic institutions. The team learned that Dallara's expertise extends far beyond the automotive industry. The company is also involved in aerospace projects, notably contributing to the European Space Agency's Rosetta probe. Dallara is additionally working on optimizing the materials used in astronauts' suits to help reduce the effects of radiation on the human body.

This visit was an opportunity for the members to understand that excellence is not achieved alone, but as a team. Indeed, Andrea Vecchi emphasized that Dallara's success is built on the values of teamwork, passion, and excellence. During the discussions, the members noted a quote that perfectly captures this philosophy: "Everyone rowing a boat in the same direction," which can be translated as "Everyone is in the same boat, rowing in the same direction."



On Tuesday, May 6, the ÉTSplore Mission had the privilege of visiting the Motorvehicle University of Emilia Romagna (MUNER), a university born from a unique partnership between some of the most iconic names in Italian automotive engineering, including Ferrari, Lamborghini, Ducati, and Dallara. This academic consortium aims to train the future specialists of the automotive industry by providing a learning environment aligned with industry needs, featuring state-of-the-art laboratories and hands-on projects.

The team was welcomed by Francesco Leali, Professor of Design Methods for Industrial Engineering, who presented the university, its mission, and its main research areas. MUNER brings together more than 120 professors, 20% of whom are international, and offers specialized programs focused on the automotive field while placing strong emphasis on academic exchange and collaboration.



The members visited several research laboratories, including the Melting Lab, which focuses on the study of electric powertrains and the electromagnetic phenomena involved in energy conversion. They also visited the Millechili Lab, founded in 2009 in collaboration with Ferrari, which conducts structural analyses on automotive chassis through crash-test simulations and the evaluation of composite materials. The goal of this laboratory is to design high-performance cars weighing under 1,000 kilograms. The objective? To reduce energy consumption while maintaining excellent handling and driving performance.

In collaboration with the MORE Manufacturing Lab, the two previously mentioned laboratories work to optimize the weight and strength of automotive structures by exploring innovative geometries such as the Gyroid, which enhances impact resistance. You can think of the Gyroid as similar to Swiss cheese, except the holes are regular and symmetrical. This shape is formed by curved tunnels that weave through space in all directions without ever intersecting, creating a kind of three-dimensional labyrinth.

The lab also studies how components respond to thermomechanical stresses such as tension, fatigue, and temperature variations. The team also discovered the Fluid Power Lab and the Laboratoriosso, which focus respectively on improving the efficiency of hydraulic systems and on developing the feasibility of hydrogen-powered vehicles.

The Automotive Sensors and Electronic Lab particularly captured the team's attention. This laboratory conducts experiments to estimate in real time a driver's psychological and emotional state, such as fatigue or distraction, using a driving simulator and immersive scenarios. The goal of this research is to pave the way for smarter and more responsive onboard systems that enhance road safety.

After visiting the Powertrain Testbench, a facility capable of testing engines with power outputs of up to 300 kW, the members discovered several student clubs, including the Formula Electric team. The students presented an original hybrid prototype equipped with an economical V2 engine in which one of the pistons is intentionally perforated to balance vibrations without participating in combustion. An electric motor is coupled to the crankshaft to act as a second piston, illustrating an ingenious approach to mechanical hybridization. This setup reduces fuel consumption while maintaining competitive performance, a remarkable innovation from a student club.

Following the tour of MUNER's facilities, the team visited Bieffe Project, where they interacted with "Mimi," a vehicle powered entirely by hydrogen. This prototype stands out with its fully 3D printed internal and external chassis, showcasing the tangible potential of additive manufacturing in the automotive field. This production method involves creating an object layer by layer from a digital model. The result is that Mimi weighs about 950 kilograms, can support nearly two tons, meets European safety standards, and can reach a top speed of 120 km/h with a range of 300 km, impressive achievements for a hydrogen powered vehicle.

The visits to MUNER and Bieffe Project allowed the members of the ÉTSplore Mission to discover an academic and industrial ecosystem deeply committed to innovation and the technological transition of the automotive sector.



Thanks to MUNER's strong ties with the industry, students also have the opportunity to build connections with renowned Italian organizations, opening valuable pathways for their future careers.

In Bologna, at the heart of the Motor Valley, the ÉTSplore Mission had the opportunity to visit the iconic Ducati factory. Celebrating its 100th anniversary in 2026, Ducati is an Italian manufacturer of both road and sport motorcycles. The brand is also active in MotoGP and Superbike championships through its Ducati Corse division. Drawing on these experiences, Ducati produces motorcycles defined by three key principles: style, sophistication, and performance.

To discover all this, the members began their visit with a tour of the new complex dedicated to the inspection of finished products, the final stage before the motorcycles are shipped. During the high season, as many as 450 motorcycles are thoroughly inspected each day before being sent to one of the brand's 783 dealerships worldwide.



The visit then continued to the engine assembly line, which is divided into two sections. The first section is dedicated to machining the engine components, while the second focuses on assembling the engine itself.

Each assembled engine is tested at 2,500 revolutions per minute to verify its compliance. If a malfunction is detected, the engine is sent to a specific area of the factory where technicians dismantle it to identify the cause of the problem before reassembling it accordingly.

The success rate of engine tests has greatly improved over the decades with advancements in technology. Today, less than 1 percent of engines show defects after testing. This level of reliability can be attributed to several factors, including technological progress, the expertise of Ducati's 30 design engineers from various countries, and the high qualification of its factory workers. It is also due to the fact that Ducati manufactures most of its engine components in-house, including camshafts and crankshafts. These parts are produced on site, from the foundry to CNC polishing machines, operating 24 hours a day, seven days a week.

The members greatly appreciated the strong connection that Ducati maintains with local universities. Throughout its history, Ducati has launched several educational initiatives. As mentioned in the article about MUNER University, Ducati is one of its founding members. In addition, Ducati created the DESI (Dual Education System) program, which offers 20 students aged 16 to 18 a two-year training opportunity each year. This program, based on a work-study approach, allows students to alternate between school and company experience, within training centers jointly organized by Ducati and Lamborghini.

The ÉTSplore Mission team also saw the entrance to a restricted area reserved for select employees, where the motorcycles for the MotoGP championships are assembled.

The engines of these bikes are so complex that it takes up to eight days to complete their assembly.



All this innovation in racing can be summed up in a few key figures for Ducati. In the Superbike Championship, Ducati has achieved the remarkable milestone of over 400 victories and more than 1,000 podium finishes. The brand has earned a total of 15 world rider titles and 18 world constructor titles. In MotoGP, Ducati won the world championship in 2007 with Casey Stoner (27) and achieved back-to-back victories in 2022 and 2023, securing two world rider titles with Francesco Bagnaia (63). The respective motorcycles from 2007 and 2022 can be seen in the images on the right.



Ending the visit at the Ducati Museum, the team discovered several historical facts. For instance, during World War II, the Ducati factory was occupied by the German army in 1943 and later destroyed by Allied bombings in 1944.

This immersion into the world of Ducati was a unique experience for the members. Through the visit to the assembly line, the team discovered the innovative expertise and outstanding craftsmanship that Ducati brings to the production of its motorcycles.



GNIS ET ANA

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On May 7, the ÉTSplore Mission visited Sapienza Università di Roma, one of the oldest and largest universities in Europe. Founded in 1303 by Pope Boniface VIII, the university now hosts more than 111,000 students and stands out for its academic excellence and cutting-edge research across multiple engineering fields.

The team was warmly welcomed by Gaetano Fusco, Professor of Transport Systems Engineering and Intelligent Transport Systems. To begin the visit, the members had the privilege of attending part of an actual master’s course taught by Professor Guido Gentile, a specialist in transport modeling and planning. The class focused on mathematical models used for the design of road infrastructures, aiming to optimize traffic flow. The professor notably presented the use of Bernoulli fractals combined with stochastic models to determine route cost and choice, taking into account the number of lanes, traffic volume, travel time, and even toll pricing.

Three PhD students then presented their research projects on sustainable transportation, introducing the concept of “X-minute cities,” and more specifically the “15-minute city.” The goal of this concept is to design urban environments where all citizens’ essential needs can be met within about fifteen minutes of walking, cycling, or using public transport. This approach aims to reduce car dependency, improve travel efficiency, and promote more human-centered and environmentally friendly urban development. The students also discussed innovative logistics solutions such as the use of drones and cargo bikes for deliveries to help reduce urban congestion.



Moreover, through the analysis of accidents and traffic patterns presented by the students, the team was able to envision a future where navigation systems could not only optimize routes based on travel time but also avoid roads identified as digitally high-risk. This research highlights the growing importance of artificial intelligence and data in urban planning and road safety.

The team also discovered several student projects and research laboratories. The visit began with a presentation by a group of students developing a hybrid spherical drone capable of both rolling on the ground and flying thanks to a surrounding spherical cage. This design reduces the drone's energy consumption and enhances its adaptability to urban environments, an innovation that perfectly showcases the creativity and ingenuity of Sapienza's student clubs.



Professor Riccardo Licciardello then presented his research in the railway field, focusing on the analysis of train wheel and rail wear, as well as the optimization of railway maintenance. The team had the opportunity to visit his laboratory and observe a mounted axle in operation, demonstrating the deformation forces applied to a train wheel under real conditions.

The visit continued with two other laboratories, the closed-circuit wind tunnel and the mechanics and vibration laboratory. The wind tunnel is used, among others, by the student clubs Sapienza Gladiators and Sapienza Corse to test the aerodynamics of their academic prototypes. As for the mechanics and vibration laboratory, it is used to analyze the impact of vibrations along three axes on different materials, contributing to the design of stronger and more comfortable structures.



Through the various visits, the members of the ÉTSplore Mission noticed that many academic projects at Sapienza integrate real-time monitoring technologies, using sensors capable of measuring tire pressure, temperature, friction, stress, and vibrations. These systems rely on wireless sensor networks and the use of optical fibers to monitor mechanical and environmental conditions.

This visit allowed the members of the ÉTSplore Mission to gain a deeper understanding of the challenges related to modern transportation while discovering concrete solutions to improve mobility, safety, and the sustainability of infrastructure.

On the afternoon of Thursday, May 8, the ÉTSplore Mission had the opportunity to visit the Centro Sviluppo Materiali (CSM), the research center of RINA specializing in the development of advanced materials. Founded in 1965, CSM is renowned for its expertise in the analysis, design, and validation of materials used in sectors such as aerospace, biomedical engineering, and energy.



Upon their arrival, the members of the ÉTSplore Mission were warmly welcomed by Alessandro Colaneri, Giacomo Giacalone, and Denise Paliotta, who guided the team through the various laboratories of the center.

The visit began with a presentation of the sample preparation stages, which include cutting, polishing, and the production of thin films. These steps are essential for analyzing materials using optical and electron microscopes. It takes approximately two days to prepare a single sample.

The team also discovered the advanced metallography laboratory, which is equipped with optical microscopes used to observe impurities in steel. The lab also features a scanning electron microscope (SEM) fitted with an energy-dispersive X-ray spectrometer (EDS). This instrument makes it possible to precisely determine the chemical composition of materials in a specific area and to visualize their internal structure, for example when studying nickel alloys. Finally, the laboratory includes a high-resolution transmission electron microscope (JEOL JEM 3200FS-HR), capable of observing crystalline defects at the atomic scale with a precision of 0.19 nanometers at 300 kV.

Thanks to X-ray diffraction and crystallography (SAD), researchers can identify the different phases of a material and understand how it reacts to thermal or mechanical treatments, all at the atomic scale.



Another fascinating aspect was the discovery of the process used to manufacture spherical metallic powders, which are employed in additive manufacturing, or layer-by-layer 3D printing. The perfectly spherical shape of these particles helps minimize voids, thereby improving the overall quality of the produced parts.

The team also visited the mechanical testing laboratory, where experiments are conducted at different temperatures on samples of various sizes. The tests include fatigue, bending, impact, hardness, and welding assessments, which are particularly relevant for components such as high-speed train rails and cables used in space missions. These tests are essential for estimating and even predicting the lifespan of materials under real-world conditions.



As part of a more environmentally sustainable approach, CSM is exploring the use of hydrogen in steel production to significantly reduce CO₂ emissions. The idea is to replace carbon, which is normally used to remove oxygen from iron ore, with hydrogen, while maintaining the same quality of steel.



The visit concluded with the discovery of 15 autoclaves capable of simulating extreme temperature and pressure conditions to test the resistance of materials. These instruments make it possible to reproduce some of the most hostile environments, such as those found in nuclear reactors, rocket engines, or underwater installations. CSM actively collaborates with universities and industries worldwide to develop high-performance materials that are resistant to corrosion, wear, and extreme temperatures.

Thanks to the warm welcome from Alessandro Colaneri, Giacomo Giacalone, and Denise Paliotta, the members, through their visit to CSM, delved into the field of advanced materials, discovering cutting-edge technologies and ingenious research methods that are shaping the materials of tomorrow.



On May 9, the ÉTSplore Mission had the opportunity to visit the Polo Tecnologico San Giovanni complex, located in Naples and affiliated with the Università degli Studi di Napoli Federico II. This innovation hub, which brings together several technology companies, research laboratories, and specialized academies, plays an important role in Italy's digital transformation and innovation ecosystem. The center supports projects related to Industry 4.0, artificial intelligence, cybersecurity, and technological entrepreneurship.

The visit began with an immersion in the Apple Developer Academy, a unique program launched in 2016. Each year, around 300 local and international students take part in a nine-month training program that requires no prior coding experience or specific degree. The program is based on a pedagogy that combines learning microcapsules with “Challenge Based Learning.”

Students do not attend traditional lectures but instead follow a personalized learning path, guided by mentors and evaluated through presentations and peer feedback. To put their skills into practice, their final project consists of developing a mobile application that is later published on the Apple Store. In addition, before starting the full program, students can participate in the Apple Foundation Program, a four-week introduction that helps them determine whether the academy suits their learning style and goals.

To carry out their work, the academy offers collaborative workspaces called “campfire labs,” designed to foster interaction and creativity among students. These spaces include circular tables for discussion, collaborative hubs for exploration or relaxation, presentation rooms, and innovation areas where students can showcase their projects.



After completing the program, students join the alumni network, keep their Apple devices, and may also receive a scholarship. Up to 60 graduates can join the “The PIER” program (Post-Formation Internship Experience and Research), which allows them to collaborate with public or private organizations on real-world projects, deepen their skills, and gain access to professional opportunities.

The visit then continued at the Cisco Networking Academy and its DTLab (Digital Transformation Lab), supported in part by the CLARA consortium. This laboratory provides hands-on training in digital transformation, networking, and programming, as well as free online modules through netacad.com, accessible to anyone interested in learning about telecommunications and cybersecurity.

This training is also offered to disadvantaged individuals. In Italy, nine prisons, including the one in Nisida, Naples, participate in the Cisco Networking Academy program, providing digital technology education to young inmates. These initiatives give them a second chance at life by helping them acquire employment opportunities and reintegrate into society in a positive way.

The team also discovered the Istituto Tecnico Superiore (ITS), a postsecondary academy focused on practical learning and market needs in telecommunications and cybersecurity. The members noted that this model, similar to that of ÉTS, values experiential learning, with a clear philosophy expressed as “Learning by doing, doing by learning” and “We don’t learn from experience. We learn from reflecting on experience.”



The success of this visit was made possible thanks to the warm support of Roberto Canonico, Luca Lepore, Gaia Ambrosino, Andrea Cosentino, and Sandra Noto. The visit to the Polo Tecnologico San Giovanni allowed the members of the ÉTSplore Mission to discover a model of inclusive innovation, where technology, education, and entrepreneurship come together to drive forward the ever-growing digital transformation of our modern era.

On May 9, the last visit of the trip took place, and the ÉTSplore Mission had the honor of discovering Gematica, a Naples-based company specializing in the development of telecommunications solutions and control systems for the transportation sector.

Gematica stands out for its collaborative approach with the Italian academic sector. The company works closely with organizations such as the National Inter-University Consortium for Telecommunications (CNIT), the National Inter-University Consortium for Informatics (CINI), the Regional Center for Information and Communication Technologies (CeRICT), and the University of Naples Federico II, through its Department of Electrical Engineering and Information Technologies.

The visit began with a presentation of the company by Marco De Angelis, President and CEO, accompanied by Sandra Notto, Head of Human Resources. This presentation allowed the members to learn more about Gematica, its expertise, and the range of solutions it offers. Indeed, Gematica has extensive expertise in the sector



providing solutions for train-to-ground communication systems, intelligent monitoring and management systems, smart stations, as well as cybersecurity and cloud computing. Through this expertise, Gematica has contributed to numerous local projects such as Rome Metro Line C and Naples Metro Line 6, as well as international projects including the Lima Metro in Peru and the Navi Mumbai Metro in India.

In the railway field, train-to-ground communication systems ensure data exchange between moving trains and infrastructures such as stations and control centers. These communication systems are used for railway signaling and the Communication-Based Train Control (CBTC) system but can also be used to transmit data from both onboard and trackside systems.

In this area, Gematica offers three main types of solutions: Wi-Fi, BTPLC (Broadband Traction Power Line Communication), and GSM-R (Global System for Mobile Communications – Railway).

These types of solutions depend on the context of each project. For example, BTPLC systems are used to ensure communication between the operations control center and trains in environments without radio coverage.

As for monitoring and management solutions, they are primarily used to visualize the exact position of trains through georeferencing on a 2D map, diagnose potential issues in advance regarding the operational status of the train fleet, view live video from onboard cameras, and transmit audio or text messages to one or several trains from the operations control center. These solutions provide train operators at the control center with an effective decision-making tool and help reduce unexpected events for passengers.

Regarding smart stations, Gematica develops solutions that collect and process data from various systems, such as ticket gates and surveillance cameras. In terms of cybersecurity and cloud computing solutions, Gematica supports clients in the implementation, management, and maintenance of cybersecurity systems, ensuring compliance with industry standards, and assists them in selecting the most suitable cloud platform regardless of the provider.



Thanks to the technical demonstrations of Gematica's tools by Paolo Valletta, Software Engineer, and Fabrizio Pisacane, Software Engineer and Head of the Technical Team, as well as the visit to the system validation room, the members discovered how digital environments ensure the reliability of software and hardware under real-world conditions.

Our visit concluded with very constructive discussions with Gematica, particularly aimed at strengthening ties with ÉTS to facilitate internship opportunities. These exchanges opened promising possibilities for future collaboration.

With this visit, the members of the ÉTSplore Mission concluded their journey in Italy with immense gratitude toward the Gematica team for their warm welcome and openness to future collaborations. This visit reaffirmed how digital innovation now lies at the heart of the future of passenger rail transport, a rapidly growing field in Quebec.



LOCAL MENTIONS



Before departing for Italy, the ÉTSplore Mission had the privilege of visiting two major organizations, including Lamborghini Montreal, where the team was welcomed by Sam Madi, Marketing Director. During this visit, the team discovered an integrated capacitor system featured in the brand's latest model, which provides an instant power boost by harnessing electricity.

This technology is implemented in these ultra-high-performance vehicles to enhance the driving pleasure of customers. The same philosophy of enriching the driving experience was observed during the visit to Alfa Romeo a few weeks later, with the presentation of the 33 Stradale. It is fascinating to see how innovation can also be designed to satisfy human emotion.



In addition, the members carried out their second local visit at CAE Montreal, a global leader in aviation simulation and training. They were welcomed by a passionate team, including Jonathan Gauthier and Jean-Philippe Tremblay, who offered them an exclusive tour of the manufacturing floor and the opportunity to try an Individual Pilot Trainer (IPT) station, as well as to board full-flight simulators.

These immersive experiences allowed the members to truly appreciate the precision of CAE's visual system and the detailed cockpit design that help recreate the most realistic flight conditions possible.

A heartfelt thank you to Audrey Falcucci, Susie Chartrand, and Nadine Dubois for their outstanding organization and warm welcome.



OUTCOMES OF THE VISITS



The 2025 edition of the ÉTSplore Mission was marked by numerous successes, both in its preparation and its execution. From the outset, the members established several long-term partnerships and represented ÉTS with professionalism throughout the various visits. True to its purpose, the ÉTSplore Mission aims to provide students with a meaningful international experience while contributing to ÉTS's global visibility and strengthening its connections with engineering industries worldwide. It is clear that this objective was once again fully achieved this year.



During each visit, the team was met with a warm welcome and engaging exchanges that were mutually enriching for both the members and the hosts. Moreover, several of the organizations visited expressed a strong interest in establishing potential collaborations with ÉTS, particularly to facilitate international mobility opportunities for ÉTS interns. WSP, Esaote, and Gematica were among the organizations that showed great enthusiasm for exploring this promising collaboration.

The ÉTSplore Mission had tangible outcomes this year. Following the visit to CAE organized by the members, the ÉTS Internships Office (Stages ÉTS) established a lasting connection with CAE to strengthen mutually beneficial collaborations. In addition, after the trip, the members arranged a visit to ÉTS for Gematica to showcase ÉTS's facilities and explore numerous potential avenues for collaboration.

These outcomes perfectly embody what the ÉTSplore Mission aims to develop and sustain, both locally and internationally. The ÉTSplore Mission is far more than an extracurricular activity — it serves as a platform for fostering collaborative partnerships for ÉTS while promoting both professional and personal growth for its members. As dedicated ambassadors, the members demonstrate professionalism and commitment by organizing visits with leading organizations, building a valuable network that benefits not only themselves but also ÉTS as a whole.

NEXT EDITION



For the 2026 edition, the ÉTSplore Mission aims to broaden its horizons by exploring a country in the southwest of Asia, renowned for its vibrant industrial and technological landscape. A first for the ÉTSplore Mission, this destination was chosen out of the new co-captains' desire to discover ambitious projects in a nation recognized for its innovation in engineering sectors such as civil infrastructure, renewable energy, transportation, aeronautics, information technology, and environmental sciences.



In April 2026, the ÉTSplore Mission will take off for the **United Arab Emirates!**

"By joining the ÉTSplore Mission team, we wanted to develop our skills in leadership, communication, and project management. The companies we visited before and during the trip allowed us to discover the many facets of engineering, helping us better define our path at ÉTS. This experience inspired us to become co-captains of the next edition — to bring our personal touch and share our curiosity for engineering with the next cohort of members."

— Roma Des Ruisseaux and Hana Khereba, Co-Captains of the ÉTSplore Mission 2026

The homecoming event, scheduled for November 10, will mark the official conclusion of the 2025 edition of the ÉTSplore Mission. During this event, participants and guests will have the opportunity to learn more about the goals, discoveries, and outcomes of the 2025 edition, as well as discover the ambitions of the 2026 edition led by the new co-captains. This evening aims not only to share the lessons and experiences gained from the trip but also to inspire members of the ÉTS student community to get involved in future editions of the ÉTSplore Mission.

It will also be the perfect occasion to meet and connect with our partners, whose support played a key role in the success of the 2025 edition. So, stay tuned to our social media channels for more exciting news about this upcoming event!

SUPPORT THE NEXT GENERATION OF ENGINEERS THROUGH OUR INTERNATIONAL STUDENT COLLABORATION INITIATIVE!



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