Projects for Industrial Innovation (Pi²)

These Projects concerns students from the 9 majors of ESILV:

- Data & Artificial Intelligence
- IoT & Security
- Modeling & computational mechanics
- Industry 4.0
- Energy and sustainable cities
- Health Engineering & Biotechnology
- Financial engineering & Quantitative finance
- Fintech
- Actuarial science

Rules of operation :

- *An Esilv project team consists of four students.*
  Depending on the amount of work required in the project, the team can consist of more than 4 students.
- *The team can bring together students from different Esilv majors according to the scope of the project.*
- *The amount of work required in the project is 10 hours per week per student, or 40 hours per week for an standard team.*
- *Teams are followed internally by ESILV, in relation with the partner who proposed the topic.*
- *A partner may have several teams cooperating on a single project, if there is enough work for each team.*
- *A partner may have several teams in fair competition on a single project.*
- *Each project ends with a restitution meeting (closing of the project).*
- *The students choose their project (they are advised - even oriented - by the teaching team) during a dedicated day.*

Projects start mid-September and end at the end of January for A5, end of March for A4.

The call for projects will take place in July.

Project launch days will be held in September (for years 5 and then for years 4) during which the partners will be able to present their projects, then the students will form their teams and choose their subject.

The A4 go on an internship from April to September at the end of the project, which gives ***the opportunity to propose in the subject of the project an extension in internship****. Same in A5, but their internship is often a pre-employment internship (departure early February, for 6 months).*

The goal of the Pi² is to push the students to appropriate a new subject in a very professional context through the relationship with the industrial partner. They must acquire new skills, both in Hard Skills and Soft Skills.

The Pi² remains a pedagogical project whose partner must be able to obtain a real benefit. The internship then makes it possible to push the work further (ex: putting into production).

Main tasks that can be requested in Pi²:

1. Realization of a state of the art.
2. Comparative study of technical solutions to a given problem (feasibility, cost, etc ...).
3. Study of a given problem and proposition of an argumentative solution.
4. Realization of a Proof Of Concept.
5. Realization of technical tasks in a major project of the Partner.

The students of each major develop in A4, A5 specific technical skills. A project may be transverse to several majors, i.e. the team may consist of different major students.

The purpose of the projects is to enable them to use these skills as well as to encourage them to acquire new ones. The discovery and the autonomous implementation of new technical fields is an integral part of the skills they must acquire.

Depending on the majors, here are some technical areas to focus on:

- Financial engineering & Quantitative finance
  - Pricing of financial instruments : technical design and / or implementation
  - Quantitative or statistical analysis of data
  - Time series analysis
  - Asset management, analysis and portfolio management
  - Development of innovative financial products
  - Big data, ML and IA for finance
  - Robotrading, roboadvisory, design / trading platform development

- Actuarial science
  - Cyber Insurance
  - Insurance fraud
  - Insurtech

- Fintech
  - Bitcoin, Blockchain, DLT and applications

- IoT & Security
  - IoT-IIoT (networks, WSN, M2M, etc…)
  - Edge computing
  - Intelligence of things
  - DevSec
  - Cybersecurity
  - Cyber resiliency
  - Security by design

- Data & Artificial Intelligence
  - Cloud Computing

- Machine Learning/Deep Learning
- Data Mining
- Devops
- AR/VR
- Data visualisation
- Web development (node/angular)
- Big Data

- Modeling & computational mechanics
  - Numerical modeling of structures
  - Modeling complex systems
  - Fluid mechanics and simulations
  - Multidisciplinary optimization and reliability

- Industry 4.0
  - Mechatronics, robotics, cobotics
  - Sensors & metrology
  - Real time embedded software and systems
  - Avionics and control systems
  - Industrial Systems Engineering
  - Multidisciplinary optimization and reliability

- Energy and sustainable cities
  - Study, sizing of renewable installations
  - Energy efficiency study
  - Sensors / IoT
  - Embedded systems
  - Sustainable development
  - Machine Learning
  - Systems modeling
  - Smart buildings
  - Smart cities

- Health Engineering & Biotechnology
  - Physiological sensors, instrumentation and metrology
  - Modeling of physiological phenomena
  - Modeling of complex systems
  - Machine Learning
  - E-health
  - Biomaterials
  - Bionics
  - Neurological interfaces
  - Signal processing and image processing
  - Wearable connected objects