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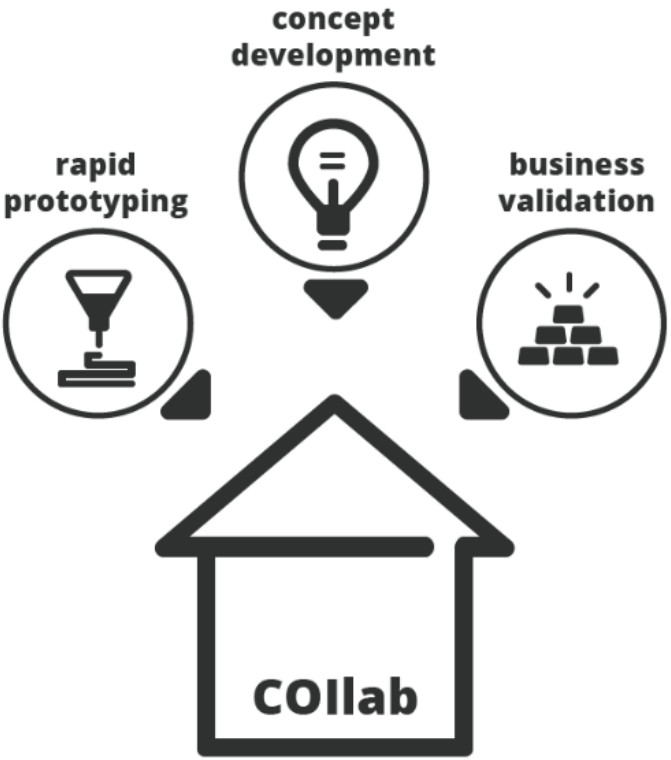
OIPEC
Open Innovation Platform
university - enterprise
collaboration

Co-funded by the
Erasmus+ Programme
of the european Union



COILabs Handbook

How to be a part of COILabs?

(For Enterprises)

Contents

Overview of Program

OIPEC is a capacity building project, co-funded by the Erasmus+ Programme of the European Union, which aims at transferring the best European practices in university-enterprise collaborations to Russian and Chinese partners.

Nowadays, bridges between universities and enterprises are needed in order to capitalize the innovation potential of all the actors; thus, it is crucial to promote strategies to approach and form durable relationships with enterprises.

The seven partners in the consortium will cooperate in order to share the experience in open innovation and set up an international platform of collaborative laboratories, places where professionals, students and researchers can work together and innovate products and services

|| Operations of "Collaborative Open Innovation Labs" for multi-country co-creation activities in developing, validating concept and management of new product/service at other (means cross-border) markets. ||

The goals of the project were:

- The creation of a platform that supports partnerships between universities and enterprises by providing easy access to

universities' expertise for small and medium enterprises

- The increase of the collaborative activities between universities and enterprises, with the aim of generating novel products/services or improving existing ones.

Our Mission

Our mission is to improve intensity and scope of universities' local and international relations with enterprises by expanding collaboration to mutual partnerships in new product/services development. This type of partnership are align with most SMEs business objectives and require intensive exchange of expertise between parties along collaboration.

Our objective is to create a new type of platform for university-industry partnership based on collaborative open innovation paradigm and design management practices to develop new or improved customer desired product/services. Collaborative management model, co-creation in new products/service/business model and network of OIPEC Partner University COILabs provide a new and unique competitive advantage for university-industry partnership.

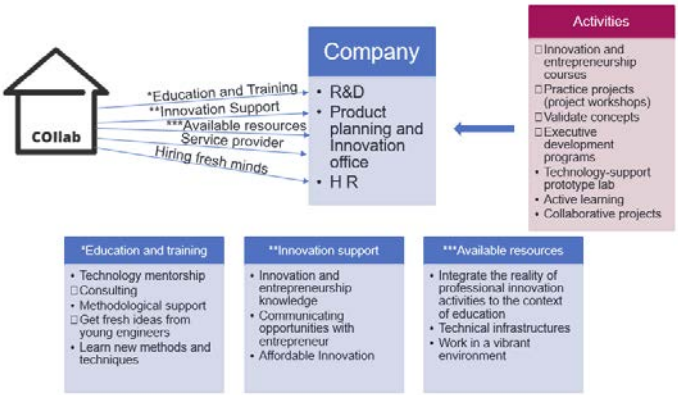


Figure 1 What COILabs offers to a company?

Participant Profile

1. *Company Profile:* The COILabs relies on in depth analysis, profiles development, and step by step relationship building with stakeholders among whom there are sources of sustainability resources and potential clients: federal and regional governments, corporations and SMEs, wealthy entrepreneurs. Provision is that the outcomes with the OIPEC will be designed to reflect stakeholders/clients' needs.
   The market sectors focused in COILabs are: Manufacturing,Service/Utilities,Agriculture/Food, ResearchSector, Mechatronics and other Technology-related.
   This innovation platform provides comprehensive support for enterprises in NPD in R & D, Product Planning and Innovation departments of a company.

   The 'Executive curriculum' (seen later), is for professionals in product development, junior management, Mid-level management, high level management and business development.

2. *Students' profile:* The curriculum is designed keeping in mind the diverse needs. Therefore, students from business, management, engineering/ design and marketing could take part in COILab projects.

Be a part of COILabs

You could be a part of COILabs by following on of tracks given below. (Contact your nearest OIPEC representative for more details)

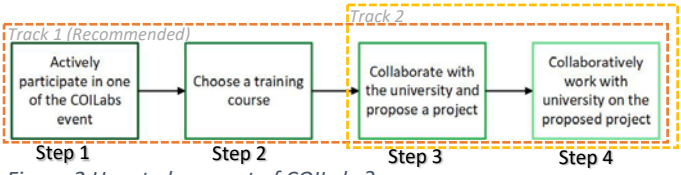


Figure 2 How to be a part of COILabs?

Collaborative Open Innovation Laboratory connects innovation-seeking companies to the best solutions, capabilities and partners around the world. It consists of three major phases while collaborating with the university.

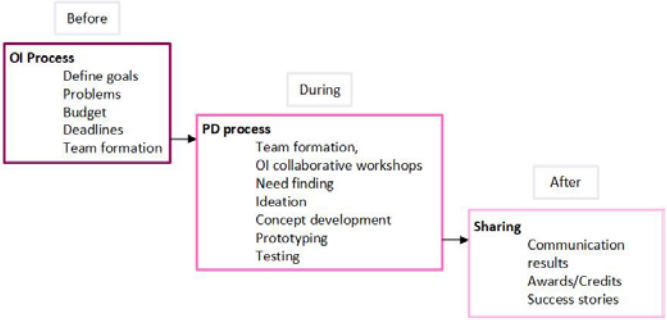


Figure 3 what happens in COILabs?

Track 1

Track 1 is the full path (recommended) in order to benefit from COILabs events, training activities (courses) and services in new/innovative product/service development.

Step1: Active participation: In order to know our courses, COILabs events are useful. In these events we give a “trailer” of our curriculum. They provided a meaningful way to explore the courses or our focus areas

Step 2: Training course: Based on your need and what you want to learn choose your course. Contact your nearest OIPEC representative for more details on the training program.

Step3: Propose a project: After receiving a training, propose a project/problem your company is facing (Figure 3).

Step4: Collaboratively work on it: University professors, students and your representative will actively work on it to get the best solution. (See Local COILabs success stories)

Track 2

However, if the company is already confident in the areas focused by COILabs, they could start with track 2. Which consists of proposing a project to the university see Figure 3 for the collaboration details. This track does not involve training or event participation, it follows Step3 and 4.

COILabs courses

The platform consists of a training course and an executive program to improve competences of enterprises' staff in innovation management and new product/service development. See full list of course in Appendix A: COILabs Curriculum

Curriculum overview

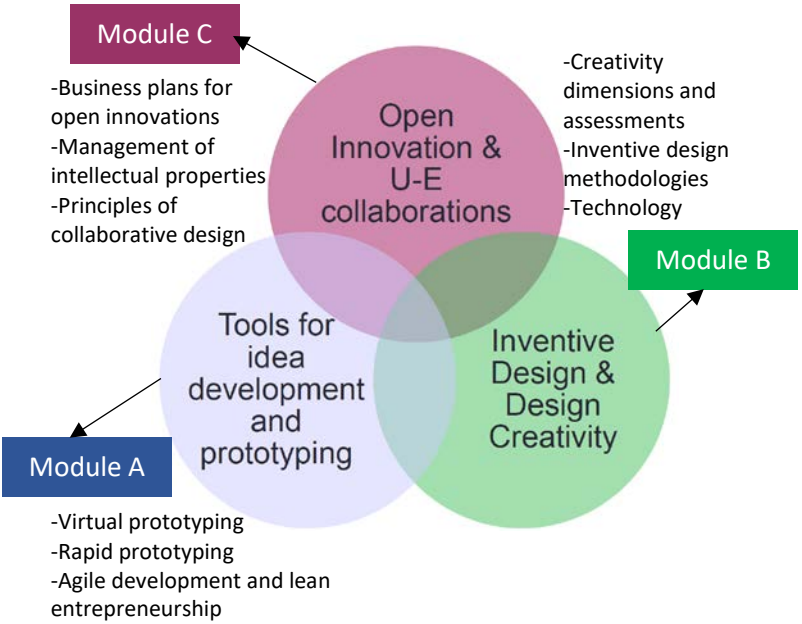


Figure 4 Areas covered by the curriculum

Concept development area (Module B): focused on design thinking and raw prototyping.

Rapid prototyping area (Module A): providing both design and operational skills.

Entrepreneurial area (Module C): to support the development and validation of business concepts

Executive program

Developed education materials provide competences for enterprise managers in new product development and in managing university-enterprise relationships in open innovation platform paradigm. See Appendix B: Executive COILabs Curriculum.

This course provides the following:

- Most suited collection of the modules for the new product/service development and product/service improvements;
- COILabs develop and run trainings in the areas of management and prototyping methodologies.
- To provide a collaborative universities - enterprises platform at partner university country.

The above approach oriented to engage enterprises from the beginning of the project using bootstrapping strategy of their involvement and commitment

Resources available

COILabs offer services in education and training and provides resources to help you to innovate.

It offers technology mentorship and consulting, methodological support by getting fresh ideas from young engineers learning new methods and techniques for your innovation.

Besides offering Innovation and entrepreneurship knowledge (as seen in the curriculum), it also provides network working opportunities with other entrepreneurs.

Collaboration with the universities will provide technical infrastructures (labs, equipment etc.) and a vibrant work environment.

"Affordable and Low Risk Innovation"

To know more about what your local COILabs offer, see the section below.

Local COILabs description and resources available

COILab China

Tianjin

COILab aims at transferring the best European practices in university-enterprise collaborations to Tianjin partners. It works to provide the solutions of problems from the enterprises, and training for generating novel products or improving existing ones for the enterprises.

COILab in Tianjin aims the question-oriented collaborative activities for small and medium enterprises.

COILab in Tianjin provide “Developing the control setup additive manufacturing”, “TRIZ based ideation and problem solving” and “systematic innovation” modules of curriculum.

Success story

Training targets: 70 corporate executives form Hebi city of China.

Training objectives: Corporate executives could Recognize the new changes in the international and domestic industrial economy, make clear how to deal with the current economic situation, how to use innovative thinking to make the smooth

transformation and upgrading of enterprises, to achieve accurate strategic positioning of enterprise development, accurate market grasp, so that the enterprise in the new era of conditions of healthy operation and rapid development.

Training time: beginning from 14, June, 2018, 3days.

Training contents: Innovative management ability

Training Venue: Hebi Career College

Hebei

The National Engineering Research Center for Technological Innovation Method and Tool of Hebei University of Technology, located in Tianjin City, is authorized by Ministry of Science and Technology, China. Its objective is to enhance their innovation ability on new technology and new products, and make them have the ability to define and solve engineering problems based on innovation methodologies from the training course. We can provide:

Training engineers: at present, we have two different levels training for selecting by enterprises and individual, one is level two with course setting “basic knowledge of TRIZ “, the other one is level three with course setting “advanced knowledge of TRIZ, as well as some other design methods”. The basic training process are selecting engineers, course study and finding problems, problem solving, presentation and defence. Those who pass the course tests will be awarded the innovation engineer certificate. The tests include test papers and the defense of the engineering problem solving process.

The offered training modules are depicted in the figure below. In the process of undertaking OIPEC programs, we integrate COILabs Curriculum, our consulting, C-TRIZ Curriculum, and case consultation, to form our training curriculum system . Also, our unique exposure to the industry, dedicated coaching and well-planned training will prepare them well to become qualified innovation

engineers. Meanwhile, those connects innovation-seeking companies to the best solutions, capabilities and partners around the world.

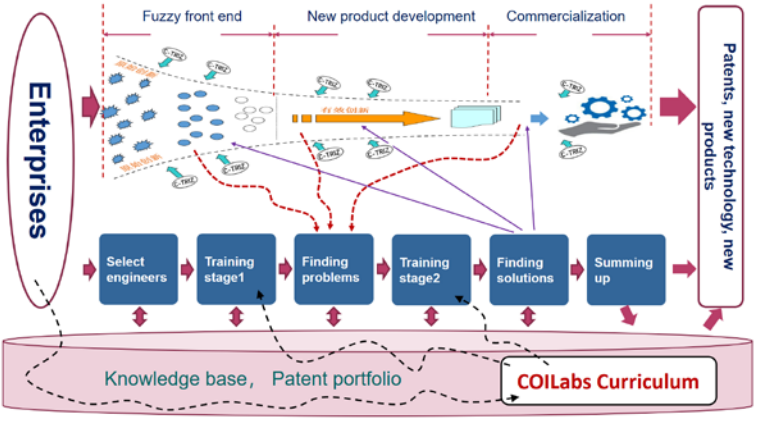


Figure 5 HEBUT Training module

During the process of OIPET project, we did far more on how to use the resources of OIPEC in our training projects. As shown in Fig.2, to sum up, 8 training projects were finished. There are 99 enterprises and 425 trainees involved in those projects.

COILabs Curriculum Support

	Training Project	Number of Enterprise	Number of Trainee	Level 1	Level 2	Level 3
1	Innovative engineer training course for North China Oilfield Company	1	55	4	20	
2	Advanced innovative engineer training course for North China Oilfield Company. （level-three）	34	72	11	7	
3	Training course for Hebei hi-tech enterprises	1	11			5
4	2017 Hebei innovation method demonstration enterprise training course	23	62	16	13	
5	Innovation engineer training course for Tianjin Anjie Facilities Services Ltd	1	40	22	6	
6	Teacher training course for innovative methods in Qingdao University of Science & Technology	1	108			
7	Training course on the Application, Promotion and demonstration of innovative methods in Hebei Province	10	41	14	16	
8	Extension, Application and demonstration Class of innovative methods in Yutian County	18	36	3	5	

Figure 6 Summary of trained enterprises/companies

One successful case:

The name of the activity: Training course on the Application, Promotion and demonstration of innovative methods in Hebei Province (2018.6.2-2018.9.28.

The organisation(s) that has (have) organised the activity: Department of Science and Technology of Hebei Province

The place where the activity took place: Qinhuangdao, Hebei Province, China

The beginning dates: 2th June 2018

Figure 7 Above and below are pictures from the COILab activity in Hebei

COILab Russia

Moscow

Lomonosov Moscow State University (MSU) is the largest self-governing (autonomous) public Russian university includes 41 Faculties (14 natural-science) and 29 Research Centres, 6 000 professors&lecturers, 5 000 researchers and about 50 000 students. MSU is multidisciplinary research hub plays a key role in Russian scientific/educational network, interacts with RAS institutes, industry research centers and business directly. The development of the triangle (education-research-innovation), and in particular, innovation system is one of the MSU priorities.

COILab Moscow provides competitive advantage for MSU-industry partnership by managing of collaborative model, co-creation in new products/service/business model and network of OIPEC partner university COILabs.

COILab Moscow will carry out their activities on the base of innovationStudio Lab and provide high quality services in the three following areas:

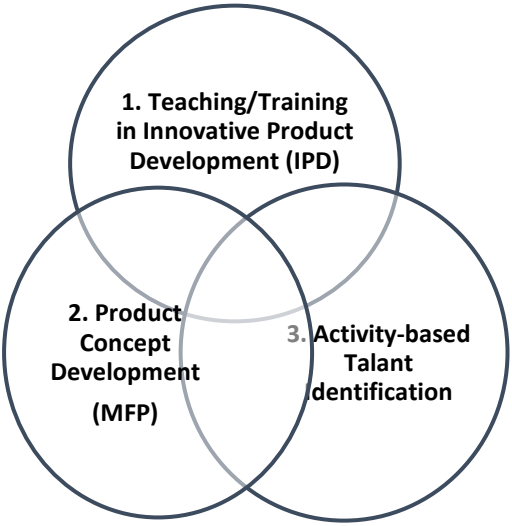


Figure 8 COILab Moscow carry out their activities in these areas

1. Teaching/Training in Innovative Product Development (IPD)

Project based learning with innovation tools Lean Startup, Customer Development, Business Model Canvas, User-Centric Design allows entrepreneurs, managers learning from critical incidents in the process of innovation product/service creation and enhance innovation and entrepreneurial competencies. COILab Moscow will teach Technology Forecasting, Design Thinking, TRIZ, Additive Technology and Prototyping, NPD and open mind and provide key entrepreneurial and manager's competencies for success in innovation development.

2. Product Concept Development (MFP)

COILab Moscow will provide high quality services for entrepreneurial teams, SMEs, mature companies based on expertise in co-creation NPD, using modern facilities with digital equipments (3D printers, milling and cutting machines, etc) for prototyping MFP (minimum feature set product). The focus of the COILab Moscow activities will be on the early (fuzzy front-end) stage of innovation product development and crossing the chasm.

3. Activity-based Talent Identification

Identifying talented and motivated students for the future job offering is an important task for companies. Innovative workshops organized by COILab Moscow uses PBL and creative techniques will enable its participants and potential employers who took part in PPPPP events to identify and select talented young generation.

Examples of project based learning activities at COILab Moscow (Russia)

OZON: Fresh cold chain development.

https://innovationstudio.ru/inside/Article.20180713084404_8490/

ROLD:Reducing humaninvolvement in dangerous and annoying interactions with household appliances

https://innovationstudio.ru/inside/Article.20180219205420_7217/

Vladimir

COILab at Vladimir State University was established on July, 12 2018. This laboratory are oriented to use resources of several scientific and researches centers of University (Additive Technology Centre, Centre of Collective Using, Student Design Bureau etc.). Information about VlSU COILab function is brought to potential customers through social networks, e-mailing and during seminars and conferences. Examples of activities are pilot educational programs implemented within the framework of the OIPEC project in 2017-2018: Additive manufacturing, Development of a new product/service and Open Innovations as an enterprise management tool.

The main target groups for VlSU COILab are small and medium innovative enterprises of Vladimir region. Also VlSU COILab involve in innovation process academic staff of University, PhD and master students.

VlSU COILab make two options for its client - the customer pays for the service on their own or reimbursement is carried out through the Fund to support small and medium-sized enterprises of the Vladimir region.

The main services of VlSU COILab are development of new products/services, rapid prototyping, development of business models and business plans, consulting services.

Success stories:

COILab Project activity with SPECIALMECHANICS which develop and implement products in the field of cars, construction and agricultural equipment

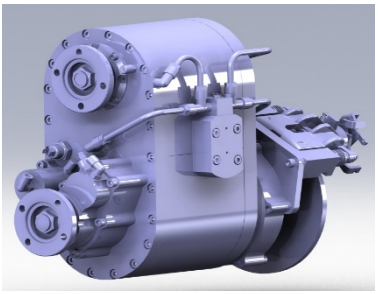


Figure 9 The CAD model of a transfer box

The project was to develop transfer boxes in 2017 (Oct –Nov 2017) along with VISU professors and master degree/PhD students. Module A of prototyping techniques of the COILab curriculum was covered in this project development. The Additive manufacturing and other prototyping labs at Mechanical engineering department were used during the collaborative activity.

Figure 10 Images of the transfer box under testing in real environment

COILab Lappeenranta

COILab Lappeenranta is a leverage for collaboration between universities and companies not only on regional level but also on global.

The core movement we try to make is to make education available and flexible using digital education technologies and to make the learning experience real, reality based, that's why teaching on corporate level or collaborating with companies to teach students is essential for digital LUT COILab. The modules offered in LUT involve:

Systematic creativity and TRIZ basics

Start Online

Inventive Product Design and Advanced TRIZ Start Online

Systematic Creativity and TRIZ- 2 days training, 1 week training (in blended form) or 2 weeks training in online format. Level Basic	Inventive Product Design and Advanced TRIZ. Advanced part of Systematic Creativity

Elements of Technology forecasting

Elements of Open Innovation

6 hours module

6 hours module

COILab LUT is a part of LUT environment where there are different collaboration models with companies:

- Industry and University develop the training together for students or company employers
- Companies get the trainings through the COIL LUT, Creativity school LUT (possibly online) or CEPHEI LUT (possibly online)
- Companies can collaborate with other universities though COILab LUT.

Collaborations vary from short consultations to longer teaching periods.

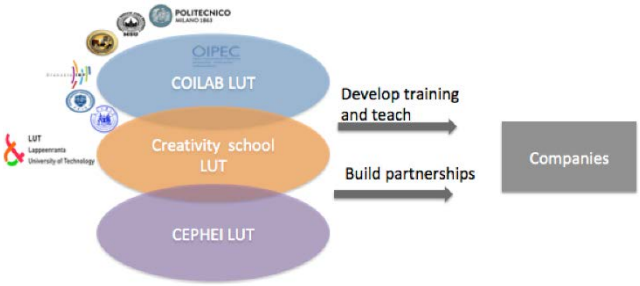


Figure 11 COILab LUT is a part of LUT environment where there are different collaboration models with companies

<u>Collaboration with Partners and Industries (success stories)</u>

Guest Lecture from Academia: Professor Jean-Francois BOUJUT from Grenoble INP discussed C-K theory and shared his insights with the participants.

Consultants from Industry: Oliver Mayer, Senior Principal at General Electric - Global Research and TRIZ expert discussed the trends of system evaluation and shared cases from his real life projects.

Figure 12 Consultants from Industry share their knowledge and case studies

In the online course, engineers and TRIZ consultants joined the platform and discussed different concepts in the forums alongside with the students.

Figure 13 LUT COILab online platform discussion.

Hackathon: In the last day of TRIZ basic course, the students participated remotely participated in a hackathon together with the students of Polytechnic Di Milano, Italy. Companies shared their real life problems (e.g. Icing problem on TRUCK roof) and students from both end tried to come up with innovative solution using the systematic creativity tools.

Outreach to Global Community: The Facebook group of the course worked as bridge between global community and the participants. The participants generate new ideas for defined problem setting together with the global community.

COILab Grenoble

COILab at Grenoble Institute of Technology is a longstanding practice of company-university collaboration that take roots in the close collaboration the institute has with the highly dynamic local ecosystem of the Grenoble's area.

Thanks to our technological platform the Industrial Engineering School delivers high level training based on manufacturing and prototyping, allowing small companies and start-ups to benefit from our experience, which gives our students the opportunity to work on real cases in a win-win situation. This includes:

- Project-based learning with industrial projects

Co-innovation involving groups of students and a company in close collaboration. This can range from concept generation to design and manufacture of prototypes.

- Intensive innovation through rapid prototyping

Intensive 4-5 days sessions on an industrial topic, with problem framing, idea generation, prototyping.

- Training on additive technologies

This teaching can include realisation of 3D printers or more focused lectures on metallic additive technology.

Examples of collaboration and success stories:

MagIA diagnostics and Grenoble INP génie industriel

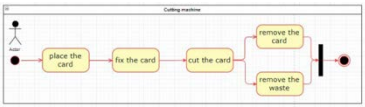
1. Collaborate to design a prototype a fast, easy and cheap chip production process

Start-Up located in Grenoble aiming at delocalising blood testing
At local medical centres, physicians in remote places or at home

A patented breakthrough innovation
Optical detection and magnetic detection of pathological markers

Advantages:
- reduction of the blood volume (5 µl)
- acceleration of test (5-15 minutes instead of 4 h)
- simplification and integration into a portable and automated device

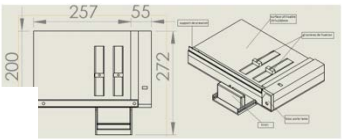
Multidisciplinary team, a dynamic environment
Students will be accompanied by several researchers, (ex-) post-docs and PhD students from several disciplines



Understand, Model

Grenoble INP

6 students worked jointly with MagIA over the academic year, for about 300 hours per student, to come up with this innovative solution.



Design, Prototype

Test

Figure 14 Design process followed in GINP COILab

2. Collaboration with Chabloz Orthopedie Company that makes prostheses for a variety of disabled people, and particularly for sportsmen.

Project: Knee prosthesis for cyclist do not allow standing position.

Goal: Design a prosthesis that allow both sitting and standing pedaling configurations and making a prototype for validation.

Means & resources:

-An existing knee prosthesis

-Experience and support of Chabloz Company

-A motivated cyclist as the final user

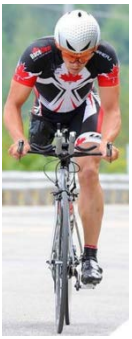


Figure 15 Final user testing of the product

COILab Milan

COILab Milan leverages the 10+ year experience of the Italian Centre of Competence on Systematic Innovation, a centre that delivers training and coaching services on engineering methods and tools for supporting innovation.

All modules are derived from research projects at Politecnico di Milano and partner universities; after achieving a suitable maturity stage, research achievements are transformed in training modules and services for industry.

The offered training modules are depicted in the figure below.

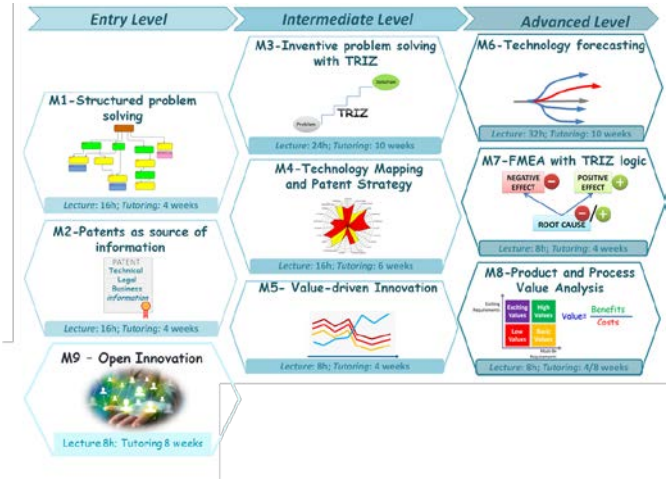


Figure 16 Offered training modules at COILab Milan

Besides the regular training modules offered by the IS centre of competence, COILab Milan offers the opportunity to start win-win collaborations with Politecnico di Milano, Dept. of Mechanical Engineering, through Open Innovation projects involving students and possibly other industrial partners according to the scheme below.

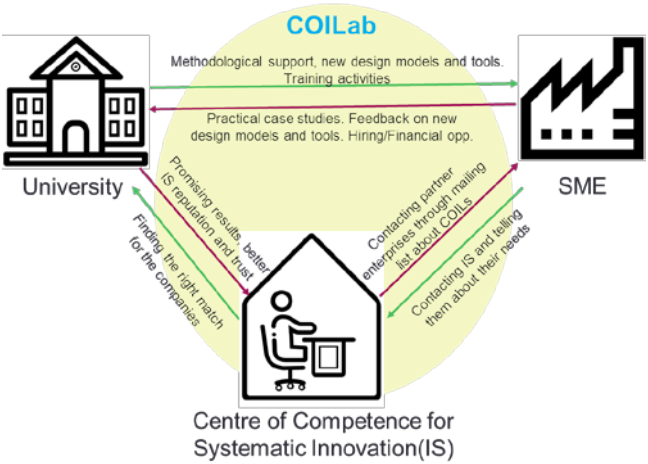


Figure 17 COILab Milan as a part of Italian Centre of Competence on Systematic Innovation

In the course of Open Innovation projects, according to the specific competencies and technological needs, the COILab Milan team will involve other departments from Politecnico di Milano, as well as the other COILabs established by OIPEC partners.

An example of one such case study

One such example of COILab activity in Milan was done between Politecnico di Milano and the ROLD Group. During the course of "Methods and Tools for Systematic Innovation" (duration: 13 weeks), the attending students had the opportunity to put into practice and deepen the theoretical elements through regular design activities on topics of industrial interest for the group Rold. This project was also extended to the Lomonosov Moscow State University students.

The collaborative activities between the technical and managerial staff of the company and students took place in the form of 13 weeks course, 3 workshops and 4 intermediate reviews. The high corporate involvement played an active role towards improving the motivation of the participants and their familiarity with the design tools learnt. The activity was also satisfactory from the industrial point of view, since some design ideas in the form of early prototypes by the groups of students, were taken into consideration by the ROLD Company for a possible industrialization.

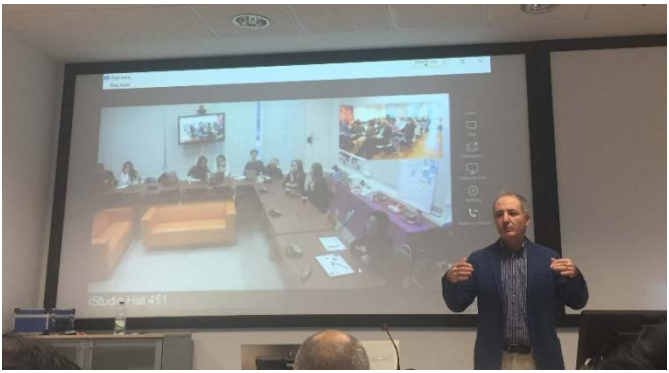


Figure 18 Prof Cascini opening the final presentation session between students of PoliMi, LMSU and ROLD company representatives

Figure 19 the best idea team being awarded by the ROLD CEO

Collaboration details

Managing Intellectual Property (IP) Rights in the framework of COILab actions is a critical point in order to create professional and proficient open innovation collaborations between universities and enterprises.

From the perspective of universities, COILabs collaborations can be regarded as educational/training actions where technical and management contents on new product development are delivered to students through learning actions based on real industrial projects provided by target Company and carried out during a training course, laboratories, workshops, collaborative actions.

From the perspective of Company, COILabs collaborations can be conceived as an opportunity to get in contact with technical and management contents of high profile on new product development and to experiment them on case studies of own interest with limited risk and effort (time and intellectual one). The industrial project is proposed by the Company.

In such a context, IP rights need to be regulated with a specific agreement aiming to state how the different issues are managed in a transparent and clear way from the beginning of the collaboration.

The actors of the COILab action will be students enrolled in the University and involved in the COILab action, at least one Company and academic supervisor(s) belonging to a University. The following documents are proposed to manage IP Rights in the contest of COILab actions:

A. **Collaboration agreement for the development of a Collaborative Open Innovation Laboratory (COILab) project at target University**, between the University and the Company. It disciplines the conditions under which the collaboration between the Company and the University can start and it establishes that results from the COILab are owned by the University.

B. **Confidentiality statement and assignment of intellectual property rights pertaining to the project**, between the University and enrolled students involved in the COILab action. It states the confidentiality by the students on managing the information exchanged during the execution of the COILab project and establishes the ownership of the results of the COILab project to the University;

C. **Agreement for the assignment of intellectual property.** It is a convention between the University and the single Company that have signed before a collaboration agreement for the development of a COILab project and, once completed the COILab project, the Company has expressed its interest in acquiring the exploitation rights relating to the output. It disciplines the transfer of the IP rights from the University to the Company, states the fee that the Company needs to pay to the University and states the conditions for registering IP rights or filing a patent application on the results of the COILab project by the Company.

These documents discipline the transfer of IP Rights first from the students to the University, then from the University to the Company and they establish the appropriate economic and/or moral reward to each actor.

They define a model of collaboration between the above-mentioned actors that can be summarized as follows:

- Step1a. The Company agrees to develop a COILab project with the University through the *Collaboration Agreement* (A) and pays a lump sum ($$) to start the collaboration;
- Step 1b. Students enrolled in the University sign the *Confidentiality statement and assignment of IP rights* (b) to the University;
- Step 2. The Company provides the project brief that will be studied within the COILab training activities;
- Step 3. Students that have signed the Confidentiality statement (B) execute the project supported by the academic supervisor(s) in the COILab project;
- Step 4. Once completed the COILab project, the University sends the Company the output;
- Step 5 *(optional)*. If the Company is interested to acquire the corresponding exploitation rights, the *Agreement for the assignment of IP rights* (C) is signed by the Company and the Company pays a success fee ($$ $$ $$) to the University;
- Step 6 *(optional)*. If the Company is interested in protecting the output of the of the COILab project,

the Company files an IP right (patent) and bears all corresponding costs and both the University and the

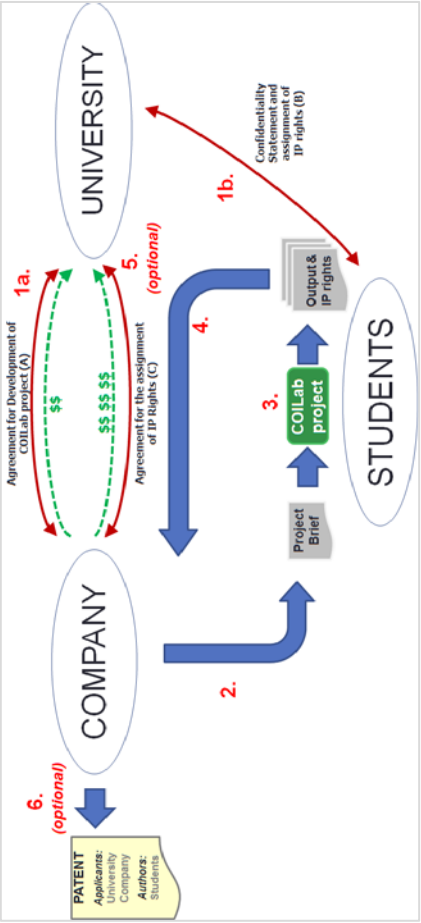


Figure 20 Model of COILab IP rights Management

Company are indicated as co-owners of the invention, and students as moral authors of the invention.

The model establishes that the Company should pay the University for the commercial exploitation of the output coming from the COILab projects, independently if the Company is interested to protect the results through filing a patent/registering models.
The format of how to manage the IP rights obviously needs to be tailored by each COILab according to the local needs and peculiarities.

Contact OIPEC representatives

Would you like to open a new COILab or be a part of it?
Contact the nearest representatives below.

POLITECNICO MILANO 1863

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collaboration

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Appendix A: COILabs Curriculum

Module	Sub module	Learning Outcome	ECTS
Module A	Tools for idea development and prototyping		
Additive Manufacturing	A1 Basic principles of additive manufacturing technologies (AMT)	A1.1 Definition and history of AMT	0.5
		A1.2 Analysis of the product drawing (detail), the possibility of achieving the quality requirements of parts,	0.5
		A1.3 Introduction to 3D scanning	1
	A2 Developing the control setup additive manufacturing	A2.1. The programming modes, the trajectory of motion, the linkage of trajectories of coordinate system CNC setup additive manufacturing	0.5
		A2.2. The split three-dimensional geometric model of the digital parts section	0.5
		A2.3. Conducting a virtual simulation of product manufacturing	1
	A3 Development of individual technological processes and new business opportunities of AMT	A3.1 Designing a single technological process of manufacturing test equipment (experimental batch) according to standard	2
		A3.2 Development of l modes of technological operations of manufacture of the product and design documentation	2
		A3.3 Business model for AMT	2
		Total ECTS	10
Module B	Inventive Design and Design Creativity		
Technology Forecasting	B1 Basic principles of Technology Forecasting (TF)	B1.1 Introduction to Forecasting methods and Technology Forecasting	0.5
		B1.2 Contemporary Methods of technology forecasting	0.5
		B1.3 Forecasting – its Application, advantages and limitations, case studies	1
	B2 Practice on techniques for support Technology Forecasting process	B2.1 The use of forecasting methods in practice and B2.1 B2.1 FORMAT methodology (Managerial part and research part).	3
		B2.2 Researching Future methodology	1
		Total ECTS	6

Innovative Design Methods	B3 Design creativity and innovation	B3.1 Introduction to design creativity and innovation	0.5
		B3.2 Design Models	0.5
	B4 Design methods and techniques	B4.1 Introduction to design thinking.	0.5
		B4.2 Exemplary design methods and tools	2
	B5 TRIZ based ideation and problem solving	B5.1 Introduction to the basic concepts of TRIZ	0.5
		B5.2 TRIZ Methods for problem analysis	1
		B5.3 Resources and analytical methods	0.5
		B5.4 Conflict resolution theory	0.5
		B5.5 Substance-field analysis	0.5
		B5.6 ARIZ algorithm	0.5
	B6 Patent Analysis	B6.1 Patent around technology separate	2
		Total ECTS	9
Module C	Open Innovation and U-E collaboration		
Innovation and entrepreneurship	C1 Basic knowledge of applied innovation	C1.1 Introduction of opportunity identification and creation	1
		C1.2 Approaches and models of innovation opportunities identification	1.5
		C1.3 Product service system design	1.5
	C2 Entrepreneurship	C2.1 Business modelling	3
		Total ECTS	7
Innovation engineering	C3 Basic contents of	C3.1 Technology innovation process	1
	C4 Innovation Management	C4.1 User experience integration for OI and sociological approach for UX	1.5
		Total ECTS	2.5
Open Innovation management	C5 Crowdsourcing for OI management	C5.1 General overview of	1.5
		C5.2 Derived values and contributions from the crowd.	1
		C5.3 Managing the crowds - cost/revenue structures, coefficients	0.5
		C5.4 Practical teaching on implementing crowd-based business models based on case studies	0.5
	C6 Management of customer co-creation: tools and methods	C6.1 Basic definitions of collaborative design, participatory design and co-creation with customers and clients.	0.5
		C6.2 Setting up the collaboration	0.5
	C7 Management of collaborative innovation development with external partners: tools and methods	C7.1 Knowing the external stakeholders	0.5
		C7.2 Understanding the motivation of the external partners	0.5
		Total ECTS	5.5
Total ETCS			40

Appendix B: Executive COILabs Curriculum

Module	Sub module	Learning Outcome	ECTS
Module A	Tools for idea development and prototyping		
Additive Manufacturing	A1 Basic principles of additive manufacturing technologies (AMT)	A1.1 Definition and history of AMT	0.5
	A3 Development of individual technological processes and new business opportunities of AMT	A3.3 Business model for AMT	0.5
		Total ECTS	1
Module B	Inventive Design and Design Creativity		
Technology Forecasting	B1 Basic principles of Technology Forecasting (TF)	B1.1 Introduction to Forecasting methods and Technology Forecasting	0.5
		B1.2 Contemporary Methods of technology forecasting	0.5
		B1.3 Forecasting – its Application, advantages and limitations, case studies	0.5
		Total ECTS	1.5
Innovative Design Methods	B3 Design creativity and innovation	B3.1 Introduction to design creativity and innovation	0.5
	B4 Design methods and techniques	B4.1 Introduction to design thinking.	0.5
	B5 TRIZ based ideation and problem solving	B5.1 Introduction to the basic concepts of TRIZ	0.5
		Total ECTS	1.5
Module C	Open Innovation and U-E collaboration		
Innovation and entrepreneurship	C1 Basic knowledge of applied innovation	C1.1 Introduction of opportunity identification and creation	1
		C1.2 Approaches and models of innovation opportunities identification	0.5
		C1.3 Product service system design	0.5
	C2 Entrepreneurship management	C2.1 Business modelling	1
		Total ECTS	3
Innovation engineering	C3 Basic contents of innovation process	C3.1 Technology innovation process and application	0.5
		Total ECTS	0.5
Open Innovation management	C5 Crowdsourcing for OI management	C5.1 General overview of crowdsourcing.	0.5
	C6 Management of customer co-creation: tools and methods	C6.1 Basic definitions of collaborative design, participatory design and co-creation with customers and clients.	0.5
		C6.2 Setting up the collaboration	0.5
	C7 Management of collaborative innovation development with external partners: tools and methods	C7.1 Knowing the external stakeholders	0.5
		C7.2 Understanding the motivation of the external partners	0.5
		Total ECTS	2.5
Total ETCS			10