



Lean Learning Academies

Progress Report

Public Part

Project information

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Executive Summary

Today, companies are faced with decreasing profit margins due to economic crisis and global competition. At the same time, in many higher educational institutions, students attend rather unattractive courses by sitting and listening to lecturers teaching ex-cathedra. In this project, a Lean Learning Academy is being developed. This is an innovative training programme on lean manufacturing that contributes to the competitiveness of companies, to the employability of employees and students, to the motivation of students, and to the attractiveness of engineering curricula. The training programme can be considered as an attractive and innovative alternative for the traditional way of teaching.

1. Target Audience:

An important way for companies to stay competitive is to focus on production efficiency and cost reduction (see e.g. Tinham, 2005). That is what lean manufacturing is aiming at (see e.g. Wood, 2004). The maximum benefit from lean manufacturing is gained by considering all its elements (i.e. principles, tools, and mindset) together as a system, and by practicing them every day in a consistent manner. As such, companies should be able to train their managers and employees continuously in lean manufacturing principles, tools, and mindset.

At the same time, higher educational institutions are trying to prepare their students to function successfully in professional life. They are looking for ways to better develop their students' competencies. More specifically, lecturers are looking for learning methods that raise students' interests, motivate them, make them better understand complex matters and allow them to study anytime and anywhere using course materials published on the web (see e.g. Yazici, 2006; Dobson and Shumsky, 2007).

2. Project objectives:

To satisfy the need for training lean manufacturing principles in companies on the one hand and to improve engineering students' employability in professional life on the other hand, an innovative training programme on lean manufacturing is being developed in the framework of this Erasmus–Lifelong Learning Programme (LLP) project. The training programme consists of a lean production simulation game that is alternated with 16 on-line course modules on different lean topics. Apart from teaching lean principles and tools, the training programme also aims at developing a lean mindset.

3. Partners and their expertise:

To develop such an innovative training programme, a collaboration is established between lean experts from five EU-universities, each supported by a company with a lot of expertise in lean management as represented in Fig. 1. This partnership assures a didactically well thought training programme with relevant and authentic content. Indeed, the company partners contribute to the project by providing the academic partners with their expertise (a priori and a posteriori) and e.g. with authentic cases; the academic partners use this expertise to develop the training programme. EURASHE (European Association of Institutions in Higher Education) is added as additional partner to help disseminate the project results to her wide member network.

	<i>Academic partners</i>	<i>Company partners</i>
Belgium 	Katholieke Hogeschool Sint-lieven 	Volvo Cars Gent 
Poland 	Rzeszow University of Technology 	PRZEMOT H.T.P. Chmiel s.j. 
Portugal 	isep Instituto Superior de Engenharia do Porto 	Associação Comunidade Lean Thinking 
Romania 	Transilvania University of Brasov 	Siemens PSE 
Sweden 	HÖGSKOLAN SKÖVDE 	Volvo Powertrain AB 
European Association of Institutions in Higher Education 		

Fig. 1. Logo's of universities and companies involved in the project

All academic partners have professors involved in this project which are lean experts. At KaHo Sint-Lieven university college a lean production game (production of polystyrene trucks) is already in use in the engineering curriculum. Högskolan Skövde developed a lean production game in which real go-carts are assembled. Volvo and Siemens both are very experienced in lean management while Przemot is just starting to implement lean management. Associação Comunidade Lean Thinking has been involved in many high level

training and consulting activities in public and private organisations and they developed new lean solutions for the service sector.

4. Approaches:

The goal of this cooperation is to develop a state-of-the-art training programme consisting of a lean production simulation game that is alternated with 16 on-line course modules on different lean topics. In order to enhance the output quality, a Deming circle approach (plan, do, check, act) is used. To guarantee the authenticity of incorporated cases and the relevance of all material included, many external experts (apart from the company experts) are involved in the project. Since a lot of development has to be performed in only two years time, monitoring the project progress is important from the very beginning. As such, measures are taken to keep all partners on track.

5. Major results achieved:

At this moment, after one year of intense cooperation, almost all course modules are developed in English. They have the format of Microsoft PowerPoint presentations illustrated with pictures, diagrams and graphs. Many slides include explanations in the textbox below the slide as a help for the trainer and as a study aid for the trainee.

Concerning the Lean Production Game, the academic partners brainstormed during the first international meeting in Skövde (Sweden). By the second international meeting in Rzeszow, our Polish partner from Rzeszow University of Technology already developed a mature prototype. In that game ballpoint pens are assembled. The game has already been tested at Rzeszow University of Technology by a number of student groups.

6. Plans for the future:

In the following months, all course modules will be translated into each partner's mother tongue, as soon as they are approved for translation by the external evaluator. At the same time, all necessary lean production game document will be developed. After approval, they will also be translated. At that moment, a prototype version of the Lean Learning Academy will be ready and should be tested by both students/alumni and employees/managers. Their feedback will be used to finalise all documents and the game setup.

7. Project website:

The project website is online since the first month of this project and can be visited at <http://www.leanlearningacademy.eu> . It consists of a public part and a 'Partners Only' part.

The public part

- informs visitors about the aims of this project,
- lists all project partners with their logo and contact info,
- displays major dissemination activities,
- mentions the coordinating project partner with logo and contact info,
- contains all finalised project deliverables in English, Dutch, Polish, Portuguese, Romanian and Swedish, both courses and lean production game documents.
- has a special page with a lot of links to websites with rich content about lean topics,
- shows some photos taken during past international project meetings.

The 'Partners Only' part is password protected because it contains documents for internal use only:

- Project management documents: meeting agendas, meeting reports, presentations showed during meetings, course evaluations from external evaluator, application form, Erasmus agreement, project budget, project handbook, LLA project presentation, LLA brochure,...
- To do lists which mention for every international meeting what should have been done by each partner. As soon as the task is done, the web master changes the red X in a green OK button. When there is an arrow on the green button, clicking on it activates a link to an output document related to the task.
- Temporary versions of course modules and lean production game documents in English, Dutch, Polish, Portuguese, Romanian and Swedish.

All partners, resonance group members, external evaluator and representatives from the Executive Agency have access to the 'Partners Only' section.

Every week, the web master takes some time to update the website with documents submitted by all project partners and by project management.

8. References

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Table of Contents

- 1. PROJECT OBJECTIVES..... 9
- 2. PROJECT APPROACH 12
- 3. PROJECT OUTCOMES & RESULTS..... 16
- 4. PARTNERSHIPS 19
- 5. PLANS FOR THE FUTURE 21
- 6. CONTRIBUTION TO EU POLICIES 22

1. Project Objectives

1.1. Project objectives

The establishment of a Lean Learning Academy has 3 major objectives:

- to enhance employability of employees and students
In times of economic recession, companies try to dismiss the least necessary employees and they only recruit people for crucial vacant functions. If students want to find a job and employees want to keep their job, both groups need to have up-to-date knowledge and trained skills.
- to improve the competitiveness of companies
Today, companies are faced with decreasing profit margins due to economic crisis and global competition. To bend this declining trend upwards, the implementation of lean management can contribute significantly.
- to create more attractive engineering curricula.
Too often, students attend rather unattractive courses by sitting and listening to lecturers teaching ex-cathedra. Although ex-cathedra teaching can be very efficient to transfer a lot of knowledge in a short period of time, it isn't suitable to train skills and attitudes. Universities are looking for better ways to develop their students' competencies. More specifically, lecturers are looking for learning methods that raise students' interests, motivate them, involve them, make them better understand complex matters and allow them to study anytime and anywhere using course materials published on the web.

1.2. How the project benefits a specific community of users and how they are involved in the project

This project benefits mainly 3 specific communities of users: companies, students and higher educational institutions

Companies:

- A Lean Learning Academy can be used as a training centre for employees and managers from different companies. Employees and managers, well trained in lean management principles, have better understanding of their production system and as a consequence they take better decisions to make their companies more competitive. Those companies will end up with lower production costs, shorter delivery lead times, better output quality, more balanced workload for the employees, more flexible production,... to name just a few advantages.

- In this project, a modular lean manufacturing course is being developed, using contributions of all company partners and a lean production game is under development using the best ideas from existing lean production games provided by the company partners. They also review the developed course modules and participate in testing the lean production game. Feedback on the developed course modules and the lean production game is also provided by company representatives which are member of a resonance group. Furthermore, the external evaluator, who has a lot of experience in industry, evaluates the project output and formulates constructive feedback. Academic partners will invite interested companies for the final dissemination event.

Students:

- The LLA's provide up-to-date courses, divided into modules (one module per lean topic), with relevant content, authentic cases from industry and reviewed by a lot of lean professionals. This state-of-the-art training programme improves the employability of our students. The innovative working method motivates students to learn more about lean. Playing the lean production game helps them to better understand complex matters and also stimulates their interest. The fact that all course modules are available on the project website, creates e-learning opportunities also for other target groups than regular students,
- Students are involved in reviewing the course modules and in testing the lean production game. University partners will invite their students for the final dissemination event.

Higher educational institutions:

- Higher educational institutions are searching for both more attractive and more efficient didactical working methods. The Lean Learning Academies (LLA's) at each of the academic partners will be sustainable examples of a successful alternative for the traditional way of teaching. They use an innovative, effective and attractive methodology to get insight in lean topics by doing. More concrete, they provide a better way to develop competencies like e.g. entrepreneurship, creativity, problem solving and team work. The project results will inspire colleagues to question the didactical working method they use.
- Universities of the academic partners in this project reserved a dedicated room for the lean production game set-up, provide meeting rooms for project meetings and of course they co-finance this project. The coordinating university also hosts the LLA project website. Some other higher educational institutions are represented in the

resonance groups where they give feedback on the project deliverables. Academic partners will invite other higher educational institutions for the final dissemination event.

1.3. Potential impact and benefits to target user groups

The Lean Learning Academies focus on three target user groups: employees/managers, students/alumni and LLA trainers.

Employees/managers:

After a training in a Lean Learning Academy (LLA), managers and employees will hopefully be convinced that also their company can benefit from the implementation of lean principles, tools and mindset. Back in their company, they should start a process cycle of continuous step-by-step innovation involving people on all company levels.

Students/alumni:

This training programme has an important impact on students/alumni. The innovative training method allows students to enjoy their study even more and alumni might be triggered to come back for further training. The lean production game provides young bachelors and masters in applied sciences with a maybe first experience as entrepreneur under safe conditions. The course modules on the other hand, allow them to go through lean topics whenever they have access to the internet. Both project deliverables help them to better understand lean management.

LLA trainers:

Since LLA's also act as lean manufacturing training centres for employees and managers, trainers are extra motivated to keep their training materials up-to-date. This pushes all trainers to keep in touch with lean manufacturing companies and to get involved in lean projects. This guarantees that they will become even better lean experts.

2. Project Approach

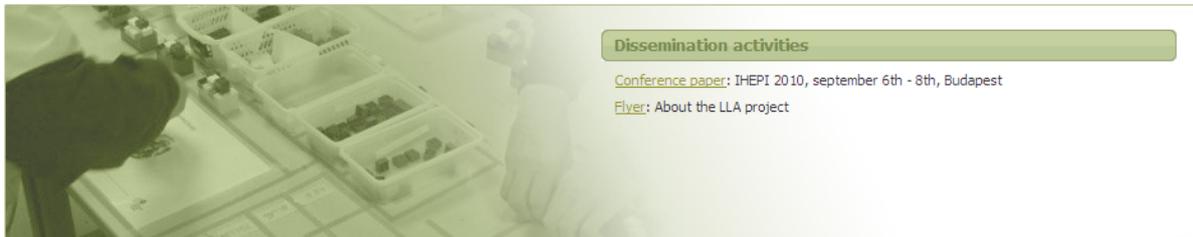
2.1. Project monitoring

In order to end up with a training programme that meets the high standards for training employees of well-known companies, project progress and output quality are continuously monitored. This monitoring is performed by several experienced people:

- **Resonance groups:** All five academic partners compose their own resonance group consisting of at least ten people from higher educational institutions and companies. To enhance the relevance and the quality of the project output, at least three times in the project lifetime, this resonance group gives feedback on materials developed by their academic project partner.
- **External evaluator:** An independent external evaluator (from Amelior management consultants, Belgium) monitors project output quality and project progress. He gives feedback on the published project deliverables, contacts partners who are far behind schedule and coaches them to keep pace with the project milestones. His reports are published on the project website.
- **To-do list published on the website:** In the 'Partners Only' section of the project website, a to-do list is added in which is mentioned for every milestone what should have been done by each partner. As soon as the task is done, the web master changes the red X in a green OK button. When there appears an arrow on the green button, clicking on it activates a link to an output document related to the task. This is represented in Fig. 2.

Lean Learning Academy

Search...



Home > Meetings / To Do > To do by international meeting in Rzeszow Poland - June 2010

Main Menu

- > Home
- > Project Management
- > Project deliverables
- > Links
- > Photo gallery

Partners Only

- > Project Documents
- > Meetings / To Do
- > Project Deliverables
- > Logout



To do by international meeting in Rzeszow Poland - June 2010

Academic Partners

To Do	BE KaHo SL	PT ISEP	PO RUT	RO UTBv	SE USK
Submit presentation showed during meeting in Skövde	OK	OK	OK	OK	X
Submit interesting materials useful for the development of one or more course modules	OK	X	OK	X	X
Write & publish an article	↓	X	X	X	X
Put a link on your website	X	OK	↓	OK	X
Make a presentation with feedback on all published course modules	X	X	X	X	X
Create a resonance group	↓	↓	↓	X	↓
Organise first national meeting	↓	OK	↓	X	X
Organise second national meeting	↓	↓	↓	X	X
Submit first course module (01/01/2010)	↓	↓	↓	↓	X

Fig. 2. To-do list in the 'Partners Only' section of the project website

Apart from the above mentioned experienced people, eight national and four international **project meetings** are scheduled to discuss project progress and output quality among partners.

2.2. Innovative didactical concept of the Lean Learning Academies:

The training programme can be seen as an innovative didactical concept. Rounds of the lean production game are alternated with short courses on lean topics. The learning cycle starts with the bottom rectangle as represented in Fig. 3:

1. The lean learning programme starts with a first round of the lean production game.
2. After that round, team members compute and measure lean key performance indicators (KPI's).

3. Looking at the indicators, team members formulate what situations, according to them, are problematic.
4. To assist the team in fully understanding the problem and to provide the team with an appropriate improvement tool, the coach teaches the related course module.
5. Afterwards, the team members use this knowledge to find the most appropriate improvement actions.
6. As soon as the whole team agrees on the actions to be taken, they implement them in the lean production game by changing the game setup. Then, the team is ready to play a next round and a next learning cycle can start.

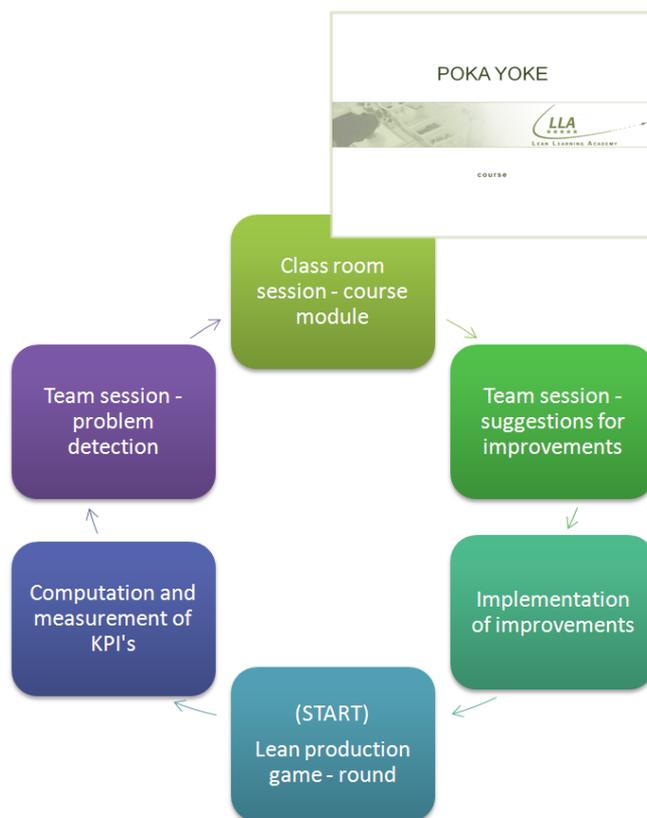


Fig 3. The innovative learning cycle

2.3. Deming circle principle:

The work programme is inspired by the Deming circle principle:

PLAN: At our first international meeting, the development of 16 course modules about lean management was assigned to the five academic partners.

DO: By the second international meeting temporary versions of almost all course modules were ready.

CHECK: During the second international meeting, the external evaluator and the other partners gave constructive feedback on all temporary versions.

ACT: Academic partners updated and finished their course modules in the following two months taking into account the feedback from the external evaluator, from other partners and from their resonance group.

PLAN: As soon as courses meet the criteria determined by the external evaluator, he labels them 'approved for translation'.

DO: By the third international meeting, all academic partners should have translated all 16 course modules.

CHECK: The course modules will be reviewed by students and by resonance group members in order to improve translation.

ACT: Courses are finalised taking into account all feedback from students and resonance group members.

A similar approach is used for the lean production game.

3. Project Outcomes & Results

Most of the project outcomes and results are published on the project website: www.leanlearningacademy.eu. Temporary documents are put in the 'Partners Only' section. At the end of August 2010, most documents were still considered as temporary.

Following project outcomes and results can be considered:

3.1. Course modules:

These are MS PowerPoint presentations mainly intended to support the trainer during classroom sessions about a lean management topic. The Lean Learning contents consist of elements in the following 3 principal areas:

- Lean operating system: e.g. course 'SMED'
- Lean mindsets and behaviours, e.g. course 'What is lean?'
- Lean leadership: e.g. course 'Policy Deployment'.

We promised to develop at least 15 such modules. At our first international project meeting, the project partners grouped all lean topics into 16 groups and decided to develop 16 corresponding course modules. At the end of August 2010, all course modules should have been ready in English but only 13 course modules were. The external evaluator approved 11 course modules for translation and insists that the 2 other modules should be reviewed first.

These temporary course modules are published on the project website:

[Home](#) ▶ [Partners Only](#) ▶ [Project Deliverables](#) ▶ [Course modules](#)

The remaining 3 modules will be developed by the end of September 2010.

3.2. Lean Production Game:

The project will develop the tools and techniques enabling the application of the lean concepts into a lean production game. The didactical concept is to alternate theoretical sessions with the application of learning into the simulated production. By running different production rounds, the process improvements are leading towards a best-in-class lean production process. After each round, productivity and efficiency metrics are visualized on

the team board. These standard metrics and the PC-programme to register and visualise the evolution will be developed in the project.

At the end of August 2010, the lean production game concept should have been designed. But, better yet, at our international project meeting at Rzeszow University of Technology, our Polish academic partner already showed a mature version of the lean production game they developed during the months before the meeting. In that game ballpoint pens are assembled. At that meeting, we decided to take that game as the project's lean production game. The accompanying game documents should be developed by January 2011 but some of them are already on the website:

[Home](#) ▶ [Partners Only](#) ▶ [Project Deliverables](#) ▶ [Lean Production Game](#)

A trainer's manual and a PC-programme to monitor and visualise game progress and results should still be developed by January 2011.

3.3. Website:

From the very beginning of the project, a project website has been developed, as was announced in the project proposal. It contains a public part and a 'Partners Only' part. The public part is aimed at the dissemination of project info and deliverables to a broad public. The 'Partners Only' section serves as a platform to share project documents with project partners and to remind them what they are expected to do by next meeting. At the end of August 2010, there were still no project deliverables in the public part of the website.

3.4. Flyer:

A project flyer, a way to disseminate our project results, has been designed and published on the home page of the project website. This flyer presents the Lean Learning Academies project to a wide public. It contains the aims of this project and indicates how we will try to reach them. It is written in English and allows all partners to print it and distribute it among interested people. The Belgian and Portuguese partner already did so.

3.5. Conference paper:

During the project's planning horizon, every partner should write an article and get it published. The project coordinator wrote a conference paper for the IHEPI 2010 conference

in Budapest from 6th till 8th of September 2010. The article has been published in the conference book and is also published on the homepage of the project website.

3.6. Network:

The project creates a strong link and multiplies the number of contacts between the local academic partners and the industrial partners in each of the participating countries. The resulting network is an indirect but very valuable outcome of this project. It will be useful to facilitate future co-operation and to further develop the Lean Learning Academy as soon as the project ends.

3.7. Renewed engineering curriculum:

The goal of this project is to develop the didactical concepts to educate lean in the engineering curriculum of the academic partners with modular course materials and to develop the tools and techniques enabling the application of the lean concepts in a simulated production environment. At this moment, engineering curricula at the academic partners aren't enriched with the project outcomes but all academic partners already looked for opportunities to make the changes as soon as the project ends.

3.8. Game setup in dedicated rooms:

To establish the Lean Learning Academies at the academic partners' universities, all academic partners already reserved two dedicated rooms. The rooms provide enough space for the lean production game setup, the classroom sessions and the team corner with visualisations, performance measurements, team management tools, follow-up instruments and communications. At some academic partners, the rooms will not exclusively be used by their Lean Learning Academy. The Polish partner already installed their lean production game (prototype) in a dedicated room.

4. Partnerships

In this project, a collaboration is established between lean experts from five EU-universities, each supported by a company with a lot of expertise in lean management. EURASHE is added as the ideal partner to disseminate our project results.

4.1. Added value:

The added value of this multi-country partnership lies in several aspects:

- All partners have specific expertise. When they are brought together, this opens opportunities to learn from each other but also to develop course modules with rich course content and with an international dimension (authentic cases from different countries) and a ingeniously designed lean production game. Some partners focus on e-learning capabilities (ISEP, Porto), others on computer simulations (USK, Skövde), others on attractive PowerPoint presentations.
- Thanks to the European partnership, the results of this project will quickly become geographically spread all over Europe. To boost this dissemination of project results, EURASHE is added as extra partner. Through their widespread network of higher educational institutions, it is convenient to distribute project results.

4.2. Our experiences:

After one year of intense collaboration to develop course modules and a lean production game, we feel no competition between partners. On the contrary, partners spontaneously exchanged materials they carefully developed in the past just to help each other.

We also feel that all partners are enthusiastic about the project aims and definitely want to attain high quality project output because they each want to introduce the Lean Learning Academy into their engineering curriculum.

4.3. Benefits of indirect partnerships:

Besides the 5 academic partners, the 5 company partners and EURASHE, in this project two partnerships with groups outside of the direct project/consortium are established: partnerships with students and with resonance groups.

Students:

As soon as the course modules and the lean production game documents will have been translated, students will be asked to review the course modules and to test the lean production game and the concept of alternating rounds of the lean production game with lectures on a lean topic. Their feedback will be used in the last phase of this project to finalise the project deliverables.

Resonance group:

At least 3 times in this project's life time, each partner organises a meeting with his resonance group. In each resonance group, at least 10 experts formulate feedback on the project deliverables in order to improve the content, the working methods and the didactical value. The experts are lean experts from companies, professors (from other universities) teaching lean management topics and experts from the educational world.

The involvement of both groups, students and resonance group members, also guarantees that the project deliverables will satisfy at least the expectations of the local target groups.

5. Plans for the Future

By the third international meeting in Ghent, all course modules should have been translated from English into Dutch, Polish, Portuguese, Romanian and Swedish and all necessary documents of the lean production game should have been developed in English.

By the fourth international meeting in Porto, all lean production game documents should be available in Dutch, Polish, Portuguese, Romanian and Swedish. The Lean Learning Academy training programme should have been tested with students/alumni and employees/managers. At the meeting in Porto, all academic partners will present the feedback they received from the participants of their test case. Based on this feedback the training programme (course modules and lean production game) must be finalised immediately after the meeting in Porto.

When the project ends, each academic partner will have sustainably integrated the Lean Learning Academy into its engineering curriculum. The training programme will then also be open to employees/managers from companies and the Lean Learning academies will start a life of providing training, getting feedback, adding new lean topics, improving course modules,... and the website will continuously be updated accordingly. This process will push the trainers to keep up with the latest evolutions and implementations of lean concepts. This guarantees that the lean course modules will continuously be updated making it a high quality course in the curriculum.

This project is the start of a new cooperation between enterprises and academic institutions. On the meeting in Rzeszow a number of partners expressed the will to further cooperate in a sequel to this project (e.g. Lean management in higher education, lean in the service sector, expanding the Lean Learning Academies with Six Sigma tools,...). In any case, the project website will allow to make further developed and updated modules available to the world.

The presence of a LLA at the academic partner and the obtained expertise by the trainers might also be the start of a process of implementing lean concepts in the quality management of the academic partners.

6. Contribution to EU policies

- The Lean Learning Academy 's training programme helps to create a strong European industrial base (i.e. **growth objective** of Lisbon strategy). The target groups for the training programme are both students/alumni and employees/managers. After having followed this training they should be well prepared to manage improvement projects in industry, making their companies more competitive and resulting in more growth.
- The Lisbon strategy also aims at **more and better quality jobs**. Well, companies that let their employees and managers follow the Lean Learning Academy's training programme invest in their human capital by improving the lean education level and lean mindset of their employees/managers. For students and alumni, on the other hand, this training programme also enhances their employability.
- The deliverables of this Lean Learning Academies project, 16 course modules and a lean production game, are the result of an intense cooperation mainly between lean experts from 5 European universities and 5 European lean companies. In all 5 European universities, this training programme will be part of an engineering curriculum. All documents include the project logo and the logo of the Executive Agency, **promoting the European dimension in higher education** (Bologna objective). Furthermore, the project website is an important show window for this project, visible and accessible from all over the world.
- This project especially contributes to the Prague declaration which added 3 key themes to the Bologna Process:
 - **Lifelong learning**: although the main deliverables of this project will be incorporated into an engineering curriculum, it also serves as a further training for employees/managers and in this way contributes to their lifelong learning. Moreover, all course modules are available in the public part of the project website, allowing all visitors to learn about lean production at any time and anywhere in the world.
 - **Involvement of students**: the Lean Learning training programme requires active involvement of participants: In the lean production game they all together assemble ball point pens; after each round they measure key performance indicators, conclude what goes wrong and agree on what aspects need to improve. To better understand the issue, they follow an intensive course on one lean topic. Afterwards, they implement what they have learned by changing the set-up of the simulation game and preparing their team for a next round.
 - **Attractiveness and competitiveness of the European Higher Education Area to other parts of the world**: The lean management training programme

meets high quality standards thanks to the incorporated feedback from students, from experts in the resonance groups, from a professional external evaluator and of course from the experienced partners themselves. The ongoing feedback leads to more relevant and frequently updated course content and didactically improved training sessions. It is a flexible course because it allows class room learning as well as e-learning and focussed short running courses as well as broader long running training programmes. All these aspects make it an attractive training programme, not only for our own students but also for students coming from abroad e.g. with an Erasmus student exchange programme.

- This Lean Learning Academies training programme contributes to the development of curricula and to fostering of methods that **promote the learning of competencies and skills that are needed in tomorrow's economy** (Bologna Beyond 2010).
- This ideal mix of educational and professional partners in this project aims at **upgrading skills and promoting employability** and at matching skills of higher education to labour market needs (cfr. Communication from the Commission, SEC-2008-3058).

