

integrated human resources
development and monitoring
system for adding innovation
capacity of labour force and
entrepreneurs of the metal
engineering, machinery and
apparatus sector



Education and Culture

Leonardo da Vinci



innomet

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FOREWORD

Economy moves steadily step by step towards increased productivity, in the direction of economic activities with higher quality. In the development of competitive ability of economy we are not just dealing with the creation of the so-called high-tech branches, but using the specific competitive abilities of the corresponding country and its economy and the constant renewal of existing industry and production. A company achieves its competitive ability greatly thanks to the technological development, skilled labour force, existing know-how and effective use of these possibilities. It is extremely important to achieve the growth of production to a greater extent by a more rational use of resources and increase in productivity. This in its turn requires the use of skilled labour force and constant development of their skills, knowledge and personal characteristics. This also causes the direct need for the implementation of lifelong learning strategy in everyday life, the development of methodological and information technology foundations of which is the main objective of the INNOMET project.

BACKGROUND

INNOMET II is an 18-month project (01.10.2005-31.03.2007), which is funded by European Community Leonardo da Vinci II programme. The project aims to develop international and trans-European methodologies by realising the internet based INNOMET human resources development system as a prototype. The project is promoted by Tallinn University of Technology (Estonia) and coordinated by Federation of Estonian Engineering Industry.

INNOMET is an acronym for development of the innovative database model for adding innovation capacity of labour force and entrepreneurs of the metal engineering, machinery and apparatus sector.

The primary objective of this INNOMET project and the INNOMET tool as such is to increase the responsiveness of education institutions to business demands and to improve the access of vocational and higher educated specialists into labour market. For that purpose it is proposed to introduce an integrated virtual database system for educational and industrial needs in the sector, which includes links to existing educational opportunities, e.g. different levels of study programmes, as well as private sector qualified labour force and mapping of the industrial needs for human resources. The main objective of the INNOMET system therefore is to supply enterprises and educational institutions with the updated information related to the needs, structure and qualification as well as about the opportunities of finding/ requesting needed courses.

INNOMET II project is based on the results of the INNOMET Leonardo da Vinci project carried out from 2003-2004 and the follow-up project is directly continuing the further development of activities and objectives set out in 2002.

In 2003-2004 INNOMET database test-version (database model) was developed, INNOMET II follow-up project is needed in order to realise and fully implement the system

INNOMET 2003-2004 project produced as a result the innomet database test-version, the value-added of INNOMET II follow-up project is to realise and fully carry out the INNOMET system functions and usability in partner areas among the network partners. The size on network partners depends on partner to partner in the frame of this Leonardo da Vinci INNOMET project total number of 25-30 companies and network schools will be evaluated in full-scale. In addition, in Estonia another project has been submitted to the European Social Fund (Measure 1.1) which objective is to implement the INNOMET system throughout the Estonia involving 10 major schools and 100 companies (full-scale data and comparability). However in different countries the scope of the project is different involving only the core network partners of the organisation.



FROM INNOMET I TO INNOMET II

INNOMET I 2003-2004

Developed INNOMET database testversion for higher and vocational education institutions, companies and other sector-related organisations

INNOMET testing results from 15 enterprises and educational organisations (tested in selected professions, qualifications and skills of work-force “blue-collar” level)

INNOMET II 2005-2007

>> To further develop and realise the unified and integrated basis (based on the test-version of the INNOMET system) for the comparable workforce performance evaluation in engineering industry in terms of local and European needs

>> To develop a specific methodology how to evaluate and measure qualifications and skills in the frame of the INNOMET system in human resources focusing on the qualifications and skills levels in of work-force (blue-collar level) and additionally engineering level of the companies of the sector and on the other hand qualifications need to be defined and evaluated in terms of educational programmes and re-training courses what kind of skills and qualifications each courses give. The key is to combine it in the INNOMET information system

Recommendations on the knowledge structure of the qualified labour force presented to higher and vocational education institution (report)

>> To develop the ontology of terms and definitions of INNOMET, including the glossary of key words of the INNOMET system in order to compare skills and qualifications. The aim is to develop a common and trans-nationally wide European understanding and definitions of the terms used (especially skills and qualifications) in the INNOMET system in 7 countries of the project consortium

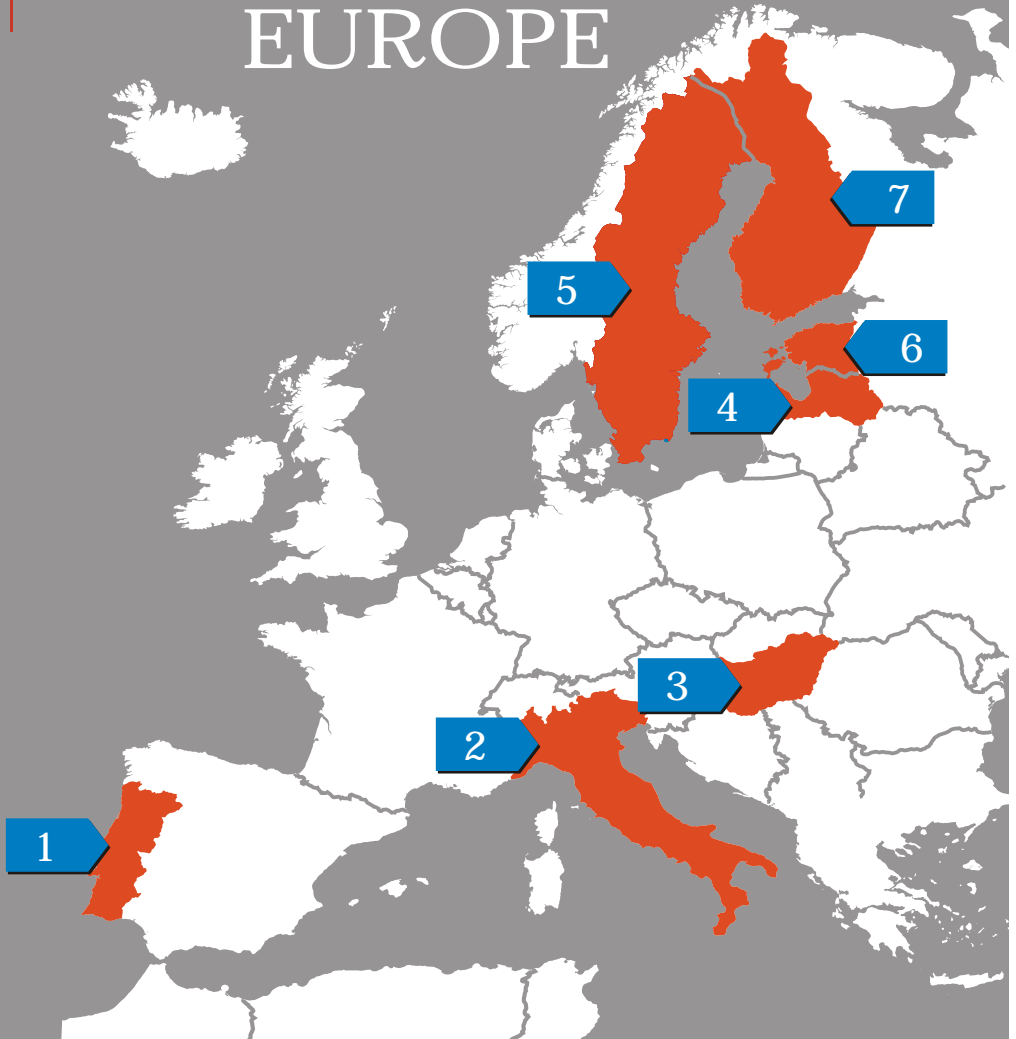
INNOMET web-page in English and national web-pages in every partner country and language

>> To provide further recommendations on the knowledge structure of the qualified labour force presented to higher and vocational education institution and to develop sample re-training courses in the field of mechanical engineering based on INNOMET system outputs.

National seminars, working groups and one trans-national seminar organised in Estonia to present the INNOMET database model and promote dialogue in the sector

>> Sample re-training courses will be also developed for engineering level with the help of the INNOMET (university level).

INNOMET IN EUROPE



1 portugal

2 italy

3 hungary

4 lat via

5 sweden

6 estonia

7 finland

OBJECTIVES

General objective of the INNOMET II project is further development and realisation of the unified and integrated basis (based on the test-version of the INNOMET system) for the comparable workforce performance evaluation in engineering industry in terms of local and European needs. The main goal of the project is to further develop the existing INNOMET system as a functioning tool to ensure qualified labour force for enterprises in the machinery, metal engineering and apparatus sector. The primary objective is to increase the responsiveness of education institutions to business demands and to improve the access of vocational and higher educated specialists into labour market.

The specific aims of INNOMET II project are the following:

- ” To develop a specific methodology how to evaluate and measure qualifications and skills in the frame of the innomet system - focusing on the qualifications and skills levels in human resources of the companies of the sector and on the other hand qualifications need to be defined and evaluated in terms of educational programmes and re-training courses what kind of skills and qualifications each courses give. The key is to combine it in the INNOMET information system (linkable database with search engines). Specific comparative analysis will be also carried out to compare the proposed evaluation methodology with the existing best practices of human resources evaluation in Southern European area.
- ” To develop the ontology of terms and definitions of innomet, including the glossary of key words of the INNOMET system in order to compare skills and qualifications. The aim is to develop a common and trans-nationally wide European understanding and definitions of the terms used (especially skills and qualifications) in the INNOMET system in 6 countries of the project consortium.

” The core objective and aim of the project is the further development and realisation of the INNOMET system - from test version to the dynamic working system - among the network partners in all partner areas by 2007 - Estonia, Sweden, Hungary and Italy and to valorise the system in new partner areas, such as Portugal and Latvia.

” to provide further recommendations on the knowledge structure of the qualified labour force presented to higher and vocational education institution and to develop sample re-training courses in the field of mechanical engineering based on INNOMET system outputs.

” To further develop social dialogue concerning existing vocational and higher education of the sector - through the development of the INNOMET information system, common working groups, one national seminar in each partner country and one trans-national seminar taking place in Estonia.

” To further develop INNOMET system, and the Internet site in the languages of project partners EST, ENG, SWE, ITA, HUN and the new partner languages of Latvian and Portuguese. The structure and elements of the INNOMET system are developed in cooperation; however each partner is responsible for further development and implementation of INNOMET system and database in their region. With the INNOMET as a transparent and integrated system it is possible to compare and value skills and qualifications both in the industry and in education programmes (outcomes of learning) in all different levels and therefore enable transfer of competencies among countries, regions and also among sectors in the longer term.

INNOMET SYSTEM

The project and INNOMET system as such identifies the bottlenecks (lack of qualified labour force, development problems related to human resources) of the educational and training system vis-à-vis the existing private sector labour force needs. Therefore, with this project, the quality of both education programmes and cooperation between education institutions and private sector companies will be improved through interaction and networking. Direct impact for different target groups is the following:

” The introduced INNOMET system offers new innovative channel to improve the everyday communication and cooperation between education institutions (professors, trainers, students), sectoral associations and companies, which are all involved to the project. In addition, professors and trainers can more easily adapt and up-date their study programmes according to the private sector labour force demand. For education and planning purposes, co-operation platform with information system help to streamline higher and vocational education programmes to respond better to market needs. This will lead to better skill and competence profile of students and trainees and better competitiveness of human resource in general.

” The INNOMET system offers dynamic and up-dated recommendations in internet-based form (as well as a report) presented to the vocational and higher education institutions (proposals of changes of study programs) have a concrete impact on the existing vocational and higher education system. This will likely result in increased quality and competitiveness of the vocational and higher education system.

” The introduced INNOMET system provides cost efficient information exchange medium for the educational schools (training providers) on the one side and the companies on the other side (potential re-training receivers). The INNOMET system on the Internet site improves direct

contacts and links between vocational schools and companies in order to cooperate in terms of common research (thesis work on different levels of education), traineeships, and job offers/seeking. In longer-term, the INNOMET system on the Internet helps companies in finding more easily needed re-training and to provide constant implications to study programmes focusing on the market need preparation of needed qualified specialists. For schools, the INNOMET system is a basis for curricula development in terms of existing educational programmes and dynamic and flexible re-training courses based on industry needs. In addition, at the same time of developing a concrete product - the INNOMET system - the project improves the open dialogue between vocational and higher education institutions, private sector and other related organisations. In long-term, the project contributes also to a better efficiency and constant transparency of needed education and training in this sector based on private sector labour force demand. In addition, the image of metalworking, engineering and apparatus sector will be also improved through the open dialogue between education institutions, students (helps to improve training possibilities and other links to private sector), companies and other organisations.





INNOMET [Main menu](#) [Courses](#) [Study Programs](#) [Certification exams](#) [Labour force needs](#) [Certification](#) [Login](#)

PUBLIC USER of INNOMET (SAMPLE FUNCTIONALITIES)

Welcome

This is Innomet database application. For more information please visit Innomet project homepage at <http://www.emilit.ee/innomet/eng.html>.

To use full functionality of this application You must have valid username and password. Send registration e-mail to tauno@staff.ttu.ee to get these.

If You have additional questions or problems, please send e-mail to our [helpdesk](#).

Select action

Courses

Shows list of courses

Study Programs

Shows list of study programs

Certification exams

Shows list of certification exams

Labour force needs

Shows prognosis of labour force needs

INNOMET full functionality for registered users

username

password

© 2003-2004 INNOMET (indefinite version 0.091)
Questions or problems? Send e-mail to our [helpdesk](#).

figure 1 innomet system

www.innomet.ee/innomet

Open "http://innomet.ttu.ee/newstart/eng/public.php" in a new window

human resources development in enterprises

Development, monitoring and making consequences of knowledge, skills, experience, personal qualities motivation factors are the main merits of human resources development in enterprise (see Figure 2).

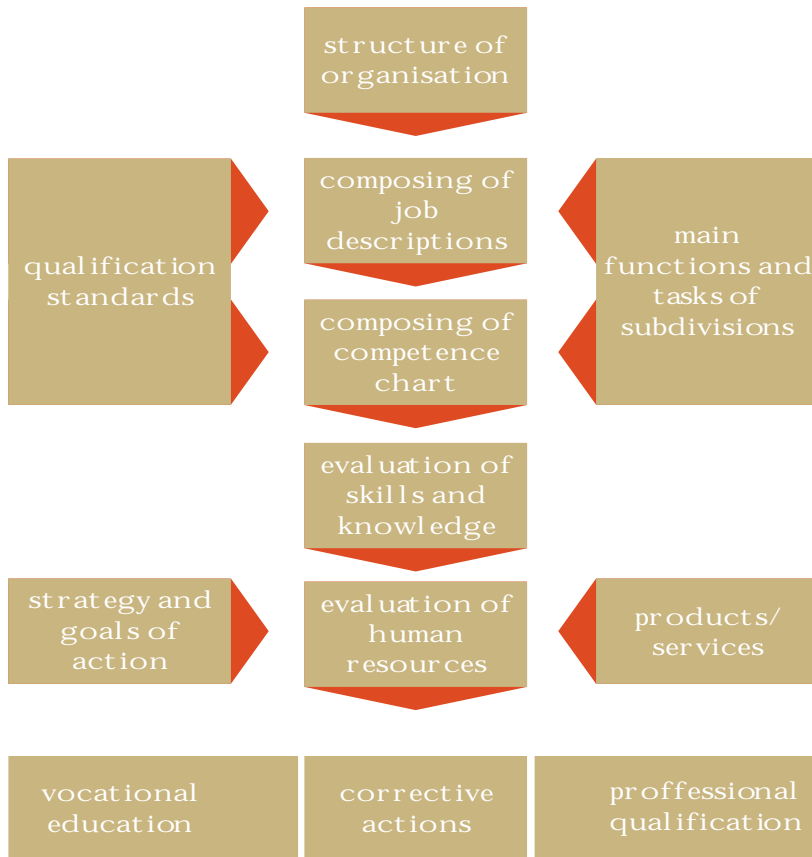


figure 2 development of human resources in enterprise

Qualification standards are the basis for evaluation of labour force qualification (in terms of resources). Application of social resource is shown on Figure 3. The qualification standard stands here as the criterion of skills, knowledge and personal qualities of social (human) resources.

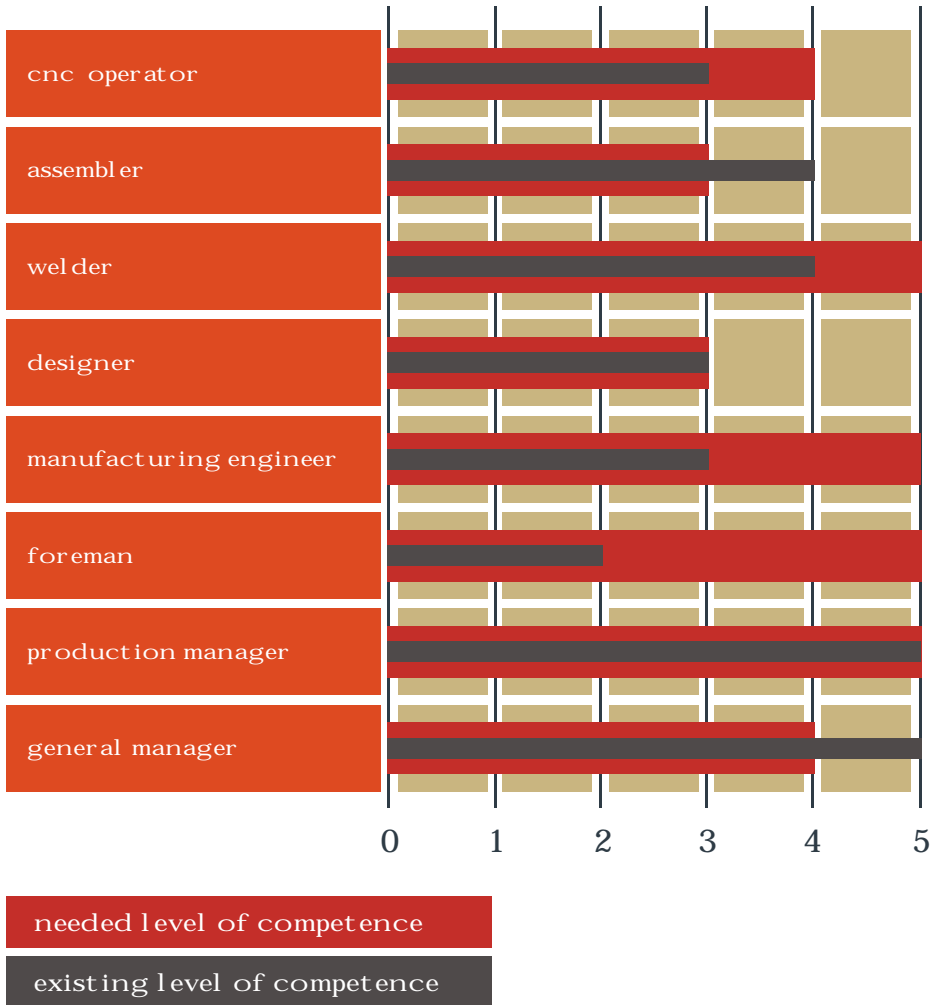


figure 3 general evaluation of human resources in enterprise

INNOMET OPERATION

On the assumption of particularity of every organisation or enterprise the core component for human resources development is the competence/skills chart.

Skills/knowledge to be evaluated are grouped according to professional standards. A professional standard is a paper, defining requirements due to professional qualification for knowledge, skills, experience, values and personal qualities. Professional standard acts as:

- specification of labour force qualification requirements;
- basis of elaboration curricula and educational programmes for educational organisations;
- basis for elaboration vocational exams as well as certification and evaluation of professional qualification;
- means for creating basis for comparison of international qualification certificates.

In practice prescription of professional requirements is substantial. Professional requirements are divided into four groups beginning with more general skills and ending with specific personal qualities essential for working at the profession. General principles of professional requirements are as follows (see Figure 4):

- general skills requirements originating from economic affairs for general skills and knowledge;
- basic skills special professional requirements for skills and knowledge;
- extra skills special professional requirements for skills and knowledge, characterised in narrow specialisation and/or necessity for executing additional assignments at current position;
- personal qualities expected personal identities and abilities required by current profession.

Definition of specific skills/knowledge depends on field of activity of enterprise. The definition process should be started in every particular case from job descriptions of a current enterprise

Evaluation of skills/knowledge is the next step towards human resources development in enterprise. For assessment a scale of grades [0.5] is used. The lowest grade is "1" and highest "5". Grade "0" is used in case when the corresponding skill is not relevant. Both needed and existing level has to be evaluated. Analysis can be performed in term of vocations as shown on Figure 5.

2A. OPERATOR	SPECIFICATION: MACHINE TOOL OPERATOR	
COMPETENCE/SKILLS	needed level (0 - 5)	existing level (0 - 5)
2.1 general skills		
2A.1.1 general skills of profession	5	4
2A.1.2 management and economy	4	3
.....
2.1 basic skills		
2A.2.1 knowledge of specific materials	5	4
2A.2.2 skills of reading technical drawings	5	4
.....
2.1 extra skills		
2A.3.1 selection of working tools	4	4
2A.3.2 knowledge of manufacturing technologies	4	4
.....
2.1 personal qualities		
2A.4.1 sense of duty	5	4
2A.4.2 precision and punctuality	5	3
.....

figure 4 Example of competence/skills chart

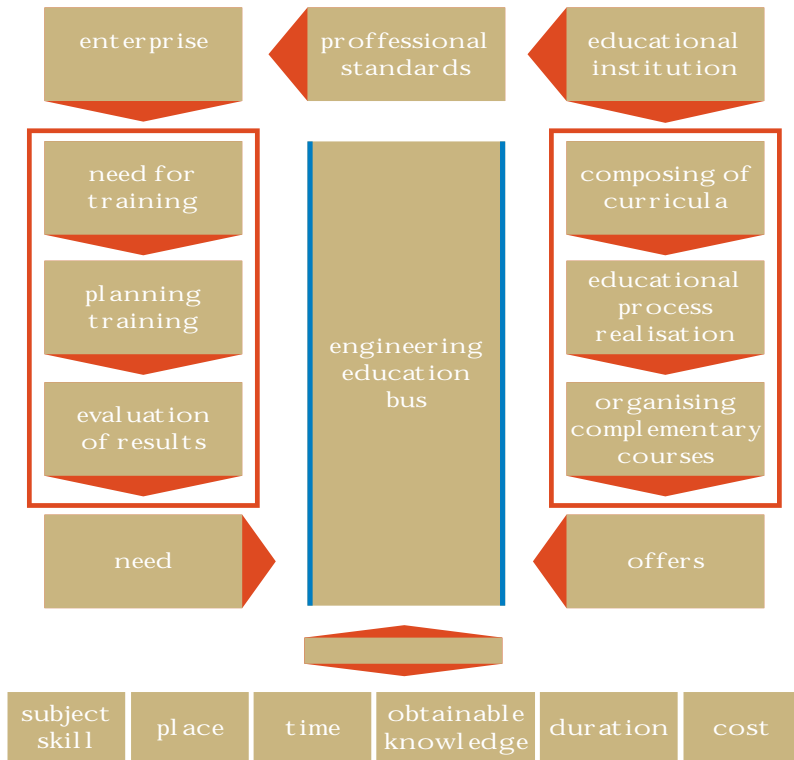


figure 5 innomet process

INNOMET will play significant role in the framework of engineering education management process. Companies try to find skilled employees to fulfil their strategy. From the other side the study programmes reflect the competency of particular educational institution. Hence there are missing coherent activities between industry and academic world. Real situation should be as follows:

In companies one should do all defined by the list of skills related to particular job on the needed qualification level.

In educational institutions student after passing the course „should know“ the subject (passive skills) and „should do“ related to the subject (active skills).

Sum of active skills of the programme should match to the lowest set of skills by the related qualification standard.



CONCLUSION

Survey covering industrial enterprises and educational organisations in Italy, Hungary, Sweden, Finland and Estonia made by INNOMET I project showed that globalisation with developed logistic create the situation where mass production will be outsourced to the countries with the cheaper labour force. The only way to survive is to invest in people by creating flexible training structures and opportunities to continuously develop the skills of the labour force in metal sector. The mentioned flexibility has to respond to industrial needs. Hence, the roadmap of real situation in labour market of skilled labour force and possible response of educational institutions should be developed.

Although there is a lack of qualified personnel in this field (especially on the vocational level) the educational institutions find it difficult to attract enough students. This is a serious problem that will require new initiatives from the industry, the educational institutions and other supporting organisations. Strategy of labour force development could be as following:

- ” With the fast changing requirements on new personnel it is almost impossible to make long-term predictions what kind of competence is needed. Detailed prognoses of what range of courses the educational institutions should provide must be based on a dynamic structure of study programmes characterised by sought-after demand, renewal and development trends.
- ” The qualification standards should be introduced on the all levels of industrial occupations. The key occupational profile states the main content of the profession. At the same time the different new skills due to technological innovation and work organisation are developing. It means that standards should be permanently under consideration
- ” There should be new training structures and tools for how not only to sustain the working capacity of the ageing work force in the field but also how to increase and develop working capacity, willingness to work and most notably, the skills. Hence the lifelong learning paradigm should be introduced in practice.

”Lifelong learning including continuing education and re-education should be supported and fostered by all levels (government, community, company).

”The general platform of engineering professions acquisition should be introduced with high quality cases. In the framework of INNOMET the special web page for newcomers should be introduced with attractive field descriptions as well as carrier and salary opportunities.

The INNOMET II is targeted to fulfil the settled targets, offering methodology and online tools for matching needs of industrial enterprises with capabilities of academic world.

As the INNOMET system model is based on quality management standards and systems, the project is fully transferable to the other sectors and target groups in different countries throughout the Europe.

project partners

federation of estonian engineering industry (EML)



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budapest university of technology and economics (BME)



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ial piemonte / training institute for workers of piemonte



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and Management**

