

RePCI-PROJECT

WORK PACKAGE 4: Resource alliance

Deliverable D4.4

Report on categories (taxonomy) the productized services as the operation potential

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1. THE AIM OF THE WP 4

The general objectives of and their indicators in the RePCI project have been presented as follows:

1. **Business line driven and strategy based cooperation management.** Indicators:
 - (1a) number of strategic partnership agreements
 - (1b) feedback from companies and HEIs
2. **Development of staff of companies is continuous and based on the strategic choices relative to the competitiveness.** Indicators:
 - (2a) number of trained Coaches and other company staff
 - (2b) feedback from stakeholders of the Competency Coaching –training and
3. **Easily accessible international resource pool to improve the competitiveness of companies.** Indicators:
 - (3a) number of services in the supply of the resource pool
 - (3b) feedback from companies and HEIs
4. **Real life problem solving in company-student-staff of HEI triangle.** Indicators:
 - (4a) number of staff of companies and HEIs and students participating in processes
 - (4b) feedback from staff of companies and HEIs and students.

The aim of the WP 4 is to form an **international resource pool** with the participation of enterprises and HEIs, which is easily available and it helps to improve the competitiveness of companies.

WP 4 includes following Tasks:

- Task 4.1 Report on the identified needs of companies for cooperation
- Task 4.2 Report on the identified fields of expertise in HEIs
- Task 4.3 Report on the identified entities on the selected fields of expertise
- Task 4.4 Report of taxonomy of enterprise-university cooperation
- Task 4.5 Supply of resource alliance - pilots
- Task 4.6 Resource map of resource alliance
- Task 4.7 Report on the evaluation of service implementation

This is a report of Task 4.4 Categorizing (taxonomy) the productized services as the operation potential.

2. TASK 4.4. Categorizing (taxonomy) the productized services as the operation potent

Description of Task 4.4:

Categorizing (taxonomy) the productized services as the operation potential

The expertise entities must be applicable for industry. It requires that the expertise is available in different forms depending on the enterprises' needs. Some of the activities may be student projects, some of them may be extremely demanding specialist work by professors in form of consulting or research project. All the supply must be formed in such a manner that these activities are easy to explain, easy to understand and there will be a clear process and "rules" for providing these activities.

Categorizing of the activities in university-enterprise cooperation means the classification of the processes and the qualities of those. Reflected to novelty factors (innovative elements) the activities are in different process categories and with the description of the qualities of each process the analysis produce the taxonomy of university-enterprise cooperation.

3. Deliverable 4.4. Report on taxonomy

Based on the productizing process there is a number of activities with the delivery process. This data is used to analyze the different embodiment of activities which will be categorized.

These categories form the groups of activities:

- student based activities,
- staff and professor based services,
- projects,
- research, etc.

and on the other way funding, which can be based on the education funding, public funding or private funding, maybe even mix of those.

Taxonomy includes the element of the content, process, funding of the activity and resources used. Taxonomy will serve in future as a framework for all the university-enterprise cooperation being useful for communication, classification and research.

3.1. Hochschule Esslingen (Germany)

From Hochschule Esslingen (P4) Professor Horst Habehauer has provided the following taxonomy

Category	Expertise
Education	Student internship and project work, Bachelor and Master Thesis, Seminars and trainings
Equipment	CAD, CAM, CDF, FEM, simulation and calculation software, Machine tools, laser technology, plastics technology, Material testing
Manufacturing	--
Testing	Component strength, Noise and vibrations,
R & D	Product development, Structural and fluid analysis, Production process
Expertise	FEM, failure analysis, tolerancing,
Measurement	Production measurement technology (including 3D), Mechanical and electrical measurements
Consulting	Mechanical Engineering, Machine design, Product development
Other	--

3.2. JAMK University Jyvaskyla (Finland)

From Jyvaskyla University of Applied Sciences (P1) Jaakko Oksanen has provided the following taxonomy

Category	Expertise
Education	Student project works Diploma thesis
Equipment	Building automation systems Machine vision systems Small sized power plant process Inspections (high-speed camera, infra-red camera) 3D printing
Manufacturing	Prototyping
Testing	Dynamic loading of structures in different temperatures Corrosion testing in different conditions Machine vision
R & D	Product development (esp. sheet metal structures) Structural analysis & FEA 3D printing
Expertise	Automation (incl. building automation systems) Energy production and efficiency Paper and pulp manufacturing and integration technology Maintenance and logistics support
Measurement	Accredited Calibration center
Consulting	Automation (incl. building automation systems) Energy Paper and pulp Maintenance and logistics support
Other	

3.3. TUCLUJ (Romania)

From Technical University Cluj (P2) Ciprian Lapusan has provided the following taxonomy

Category	Expertise	Funding resources
Research	<ul style="list-style-type: none"> - Design, analysis and testing of complex mechanisms, compliant mechanisms) - Design of mechatronic systems - Design and implementation of autonomous mobile robots for pipe inspection - Design and implementation of autonomous mobile robots adaptable to various types of terrain - Efficient thermal solutions, Solar Energy, Heat Pumps, Heat recovery, Refrigerators, Cogeneration, Trigenation - Optical methods of experimental analyses in the mechanics of the deformable solid, numerical methods in engineering - Efficient energy management systems - Robotics and high precision micro-robotics - Design of drive systems, Modeling of actuators - Assistive technology. Methods and Equipment for special needs people 	<ul style="list-style-type: none"> - Public funding - Private funding - Mix of private & public funding
Equipment		
Manufacturing	<ul style="list-style-type: none"> - CNC manufacturing 	<ul style="list-style-type: none"> - Private funding
Testing		
Education	<ul style="list-style-type: none"> - Student project work in mechanical/mechatronic field - Bachelor thesis in mechanical/mechatronic field - Master thesis in mechanical/mechatronic field - PhD thesis in mechanical/mechatronic field 	<ul style="list-style-type: none"> - Education/Public funding - Private funding - Mix of public & private funding
Expertise	<ul style="list-style-type: none"> - Development of automated industrial processes 	<ul style="list-style-type: none"> - Private funding

Measurement	<ul style="list-style-type: none"> - Industrial measurements - Material testing and characterization, strain-stress analysis in mechanical parts, 	<ul style="list-style-type: none"> - Private funding - Mix of private & public funding - Public funding
Consulting	<ul style="list-style-type: none"> - Mechanical Engineering - Mechatronic systems - Technical thermodynamics - General and financial Management, human resources, marketing, strategic management - Control of industrial process 	<ul style="list-style-type: none"> - Private funding
Other		

3.4. Miskolci Egyetem (Hungary)

From University of Miskolc (P3) prof. Gabriella Vadászné Bognár has provided the following taxonomy

Category	Expertise
Education	Student project work Diploma thesis Trainings
Testing	Air turbulence testing Motor analysis Noise testing Vibration testing Dynamic testing of conveyor handling Surface testing
R & D	Product development Structural analysis Machine tool design Design of Information and Material Flow Systems Chemical safety
Expertise	Welding Acoustic Machines Cranes Quality control PLC programming Heat treating
Measurement	3D scanning Industrial measurements
Consulting	Mechanical Engineering Machine design Product development

	Mechatronics Logistics 3D planning
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4. Summary

In the following table the activities/expertise offered by the partners from Mechanical Engineering are summarized. We denote the partners with different colours:

P1 – JAMK (Finland) – by red

P2 – TUCLUJ (Romania) – by green

P3 – ME (Hungary) – by blue

P4 – HE (Germany) – by brown

Category	Expertise	Funding resources
Research	<p>Student project works</p> <p>Diploma thesis</p> <p>Design, analysis and testing of complex mechanisms, compliant mechanisms)</p> <p>Design of mechatronics systems</p> <p>Design and implementation of autonomous mobile robots for pipe inspection</p> <p>Design and implementation of autonomous mobile robots adaptable to various types of terrain</p> <p>Efficient thermal solutions, Solar Energy, Heat Pumps, Heat recovery, Refrigerators, Cogeneration, Trigeneration</p> <p>Optical methods of experimental analyses in the mechanics of the deformable solid, numerical methods in engineering</p> <p>Efficient energy management systems</p> <p>Robotics and high precision micro-robotics</p>	<p>Public funding</p> <p>Private funding</p> <p>Mix of private & public funding</p>

	<p>Design of drive systems, Modeling of actuators</p> <p>Assistive technology. Methods and Equipment for special needs people</p> <p>Student project work</p> <p>Diploma thesis</p> <p>Trainings</p> <p>Student internship and project work, Bachelor and Master Thesis, Seminars and trainings</p>	<p>Public funding</p> <p>Public funding</p> <p>Mix of private & public funding</p>
Equipment	<p>Building automation systems</p> <p>Machine vision systems</p> <p>Small sized power plant process</p> <p>Inspections (high-speed camera, infra-red camera)</p> <p>3D printing</p> <p>Air turbulence testing</p> <p>Motor analysis</p> <p>Noise testing</p> <p>Vibration testing</p> <p>Dynamic testing of conveyor handling</p> <p>Surface testing</p> <p>CAD, CAM, CDF, FEM, simulation and calculation software, Machine tools, laser technology, plastics technology, Material testing</p>	<p>Mix of private & public funding</p>
R & D	<p>Product development (esp. sheet metal structures)</p> <p>Structural analysis & FEA</p> <p>3D printing</p> <p>Product development</p> <p>Structural analysis</p> <p>Machine tool design</p> <p>Design of Information and Material</p> <p>Flow Systems</p> <p>Chemical safety</p>	<p>Mix of private & public funding</p>

	Product development, Structural and fluid analysis, Production process	
Manufacturing	Prototyping CNC manufacturing	Private funding
Testing	Dynamic loading of structures in different temperatures Corrosion testing in different conditions Machine vision	
Education	Student project work in mechanical/mechatronics field Bachelor thesis in mechanical/mechatronics field Master thesis in mechanical/mechatronics field PhD thesis in mechanical/mechatronics field	Education/Public funding Private funding Mix of public & private funding
Expertise	Automation (incl. building automation systems) Energy production and efficiency Paper and pulp manufacturing and integration technology Maintenance and logistics support Development of automated industrial processes Welding Acoustic Machines Cranes Quality control PLC programming Heat treating FEM, failure analysis Tolerancing,	Private funding Private funding
Measurement	Accredited Calibration center	

	<p>Industrial measurements</p> <p>Material testing and characterization, strain-stress analysis in mechanical parts</p> <p>3D scanning</p> <p>Industrial measurements</p> <p>Production measurement technology (including 3D)</p> <p>Mechanical and electrical measurements</p>	<p>Private funding</p> <p>Mix of private & public funding</p> <p>Public funding</p> <p>Mix of private & public funding</p>
Consulting	<p>Automation (incl. building automation systems)</p> <p>Energy</p> <p>Paper and pulp</p> <p>Maintenance and logistics support</p> <p>Mechanical Engineering</p> <p>Mechatronics systems</p> <p>Technical thermodynamics</p> <p>General and financial Management, human resources, marketing, strategic management</p> <p>Control of industrial process</p> <p>Mechanical Engineering</p> <p>Machine design</p> <p>Product development</p> <p>Mechatronics</p> <p>Logistics</p> <p>3D planning</p> <p>Mechanical Engineering</p> <p>Machine design</p> <p>Product development</p>	<p>Private funding</p>