Future of Industrial Engineering and Management in Europe

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Polytechnic of Bari, Italy

President of the European Academy for Industrial Management

Outline

1. International Industrial Competition and European Challenges
2. EU Industrial Engineering Education
3. The Role of the European Academy for Industrial Management
4. Forward an European School of Industrial Engineering
5. Conclusions
## International Competition: Country Manufacturing Competitiveness Index Ranking (2013)

(2012 Survey on 550 CEO and Senior Mfg Leaders
Deloitte, Touche Tohomatsu Ltd and The US Council of Competitiveness)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Index Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>China</td>
<td>10.00</td>
</tr>
<tr>
<td>2</td>
<td>Germany</td>
<td>7.98</td>
</tr>
<tr>
<td>3</td>
<td>United States of America</td>
<td>7.84</td>
</tr>
<tr>
<td>4</td>
<td>India</td>
<td>7.65</td>
</tr>
<tr>
<td>5</td>
<td>South Korea</td>
<td>7.59</td>
</tr>
<tr>
<td>6</td>
<td>Taiwan</td>
<td>7.57</td>
</tr>
<tr>
<td>7</td>
<td>Canada</td>
<td>7.24</td>
</tr>
<tr>
<td>8</td>
<td>Brazil</td>
<td>7.13</td>
</tr>
<tr>
<td>9</td>
<td>Singapore</td>
<td>6.64</td>
</tr>
<tr>
<td>10</td>
<td>Japan</td>
<td>6.60</td>
</tr>
</tbody>
</table>

### Current Competitiveness

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Index Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>United Kingdom</td>
<td>5.81</td>
</tr>
<tr>
<td>16</td>
<td>Australia</td>
<td>5.75</td>
</tr>
<tr>
<td>19</td>
<td>Czech Republic</td>
<td>5.71</td>
</tr>
<tr>
<td>20</td>
<td>Turkey</td>
<td>5.61</td>
</tr>
</tbody>
</table>

### Competitiveness in Five Years

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Index Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>China</td>
<td>10.00</td>
</tr>
<tr>
<td>16</td>
<td>India</td>
<td>8.49</td>
</tr>
<tr>
<td>19</td>
<td>United Kingdom</td>
<td>5.59</td>
</tr>
<tr>
<td>20</td>
<td>Switzerland</td>
<td>5.42</td>
</tr>
</tbody>
</table>
# International Competition: Global Drivers of Manufacturing Competitiveness Index ranking (2013)

(2012 Survey on 550 CEO and Senior Mfg Leaders Deloitte, Touche Tohomatsu Ltd and The US Council of Competitiveness)

<table>
<thead>
<tr>
<th>Overall rank (1-10)</th>
<th>Overall index score</th>
<th>Main driver</th>
<th>Most important sub-components</th>
<th>Sub-component rank (1-40)</th>
</tr>
</thead>
</table>
| 1                   | 10.00               | Talent-driven innovation | Quality and availability of researchers, scientists, and engineers  
Quality and availability of skilled labor | 1  
2 |
| 2                   | 8.42                | Economic, trade, financial and tax system | Tax rate burden and system complexity  
Clarity and stability of regulatory, tax and economic policies | 3  
5 |
| 3                   | 8.07                | Cost and availability of labor and materials | Cost competitiveness of materials  
Availability of raw materials | 11  
21 |
| 4                   | 7.76                | Supplier network | Cost competitiveness of local suppliers  
Ability of supply base to innovate in products and processes | 8  
9 |
| 5                   | 7.60                | Legal and regulatory system | Stability and clarity in legal and regulatory policies  
Labor laws and regulations | 7  
13 |
| 6                   | 6.47                | Physical infrastructure | Quality and efficiency of electricity grid, IT and telecommunications network  
Quality and efficiency of roads, airports, ports, and railroad networks | 4  
16 |
| 7                   | 6.25                | Energy cost & policies | Cost competitiveness of energy  
Ongoing investments to improve and modernize energy infrastructure | 14  
20 |
| 8                   | 3.99                | Local market attractiveness | Size and access of the local market  
Intensity of local competition | 27  
36 |
| 9                   | 2.48                | Healthcare system | Cost of quality healthcare for employee and society  
Regulatory policies (e.g., pollution, food safety, etc.) that are enforced to protect public health | 26  
33 |
| 10                  | 1.00                | Government investments in manufacturing and innovation | Government investments in R&D: science, technology, engineering and manufacturing  
Private and public sector collaboration for long-term investments in R&D: science, technology, engineering and manufacturing | 29  
30 |

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**Context Analysis: International Competition for Manufacturing**

Curitiba (Brazil)  
7-10 October 2014
## Talent-driven Innovation Country Level Competitiveness Perception

Percentage of executives that reported a country was extremely competitive with respect to the local cost and availability of labor.

<table>
<thead>
<tr>
<th>Country</th>
<th>Agree/Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>90%</td>
</tr>
<tr>
<td>India</td>
<td>87%</td>
</tr>
<tr>
<td>Brazil</td>
<td>70%</td>
</tr>
<tr>
<td>United States</td>
<td>39%</td>
</tr>
<tr>
<td>Germany</td>
<td>32%</td>
</tr>
<tr>
<td>Japan</td>
<td>29%</td>
</tr>
</tbody>
</table>

Source: Deloitte Touche Tohmatsu Limited and U.S. Council on Competitiveness, 2013 Global Manufacturing Competitiveness Index
Country Level Drivers of Competitiveness

<table>
<thead>
<tr>
<th>Selected Country/Manufacturing Competitiveness Drivers</th>
<th>Germany</th>
<th>U.S.</th>
<th>Japan</th>
<th>China</th>
<th>Brazil</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talent-driven innovation</td>
<td>9.47</td>
<td>8.94</td>
<td>8.14</td>
<td>5.89</td>
<td>4.28</td>
<td>5.82</td>
</tr>
<tr>
<td>Economic trade, financial and tax system</td>
<td>7.12</td>
<td>6.83</td>
<td>6.19</td>
<td>5.87</td>
<td>4.84</td>
<td>4.01</td>
</tr>
<tr>
<td>Cost of labor and materials</td>
<td>3.29</td>
<td>3.97</td>
<td>2.59</td>
<td>10.00</td>
<td>6.70</td>
<td>9.41</td>
</tr>
<tr>
<td>Supplier network</td>
<td>8.96</td>
<td>8.64</td>
<td>8.03</td>
<td>8.25</td>
<td>4.95</td>
<td>4.82</td>
</tr>
<tr>
<td>Legal and regulatory system</td>
<td>9.06</td>
<td>8.46</td>
<td>7.93</td>
<td>3.09</td>
<td>3.80</td>
<td>2.75</td>
</tr>
<tr>
<td>Physical infrastructure</td>
<td>9.82</td>
<td>9.15</td>
<td>9.07</td>
<td>6.47</td>
<td>4.23</td>
<td>1.78</td>
</tr>
<tr>
<td>Energy cost and policies</td>
<td>4.81</td>
<td>6.03</td>
<td>4.21</td>
<td>7.16</td>
<td>5.88</td>
<td>5.31</td>
</tr>
<tr>
<td>Local market attractiveness</td>
<td>7.26</td>
<td>7.60</td>
<td>5.72</td>
<td>8.16</td>
<td>6.28</td>
<td>5.90</td>
</tr>
<tr>
<td>Healthcare system</td>
<td>9.28</td>
<td>7.07</td>
<td>8.56</td>
<td>2.18</td>
<td>3.33</td>
<td>1.00</td>
</tr>
<tr>
<td>Government investments in manufacturing and innovation</td>
<td>7.57</td>
<td>6.34</td>
<td>6.80</td>
<td>8.42</td>
<td>4.93</td>
<td>5.09</td>
</tr>
</tbody>
</table>

Scores on a 10-point scale, where 1 is “Least competitive” and 10 is “Most competitive” – adjusted for country size and industry

Source: Deloitte Touche Tohmatsu Limited and U.S. Council on Competitiveness, 2013 Global Manufacturing Competitiveness Index
Lost Ground of European Industry in last two decade

The rise of the emerging economies as industry players
Europe – a diverse picture

Market share of French and British Industry, on the road of deindustrialization, shrink since 2000 ...

... while ...

German and Eastern European industrial sectors are gaining market

Many losers, few winners
Focusing on the European Industry

European industry generates:

- 15 % of EU Added Value
- 75 % of EU Export
- 80 % of EU Innovation

European Manufacturing aims at increasing its contribute to GDP from 15 % to 20 % by 2020.
EU Strategy: ‘Horizon 2020’ & ‘Industry 4.0’
**‘Horizon’ 2020 EU Strategy**

80 b€ for Research and Innovation EU program over 2014 – 2020 period

### Grand Challenges of the EU 2020 Strategy

- **Economic Growth and Jobs’ Creation**
- **Energy and Climate Change**
- **‘Well-being’ and Social Welfare**

### Industrial Challenges

- **Key-Enabling Technologies:**
  - Materials & Manufacturing
  - ICT-based Services
- **Image of Manufacturing**
- **Holistic approach in R&D and industry transformation**
- **Sustainability Issues**
  - Innovation and Project Financing
  - Teaching Factory
  - University / Industry Education

### Societal Challenges

- **Healthy Aging Society**
  - Workforce Aging
  - Health-care Systems
- **Sustainable Urban Development**
  - Future Energy networks
  - Urban and Industrial Symbiosis
  - Global Security

**Curitiba (Brazil)**

7-10 October 2014
A KETs-based product is (*):

“(a) an enabling product for the development of goods and services enhancing their overall commercial and social value;
(b) induced by constituent parts that are based on nanotechnology, micro / nano electronics, industrial biotechnology, advanced materials and/or photonics;
(c) produced by (but not limited to) advanced manufacturing technologies.’

(*) European Commission, June 2012
Jobs’ Creation by KETs in EU

- Nanotechnology: 160,000 workers (+25% from 2000)

- Micro / nano – electronics: 700,000 additional jobs during the last decade in Europe (more service-oriented and highly skilled jobs)

Knowledge Generation on KETs is in EU but ...

- SMEs are a key driver of innovation:
  in the photonics sector 5,000 European companies are SMEs; in Germany, about 80% of the nanotechnology companies are small or medium sized.

Industrial Challenges

Causes limiting KETs Exploitation

i. Lack of a common EU industrial policy

ii. High Investments

iii. Shortage of skill and competences
Industrial Challenges

3D Low Cost Printers

• Economic / Low Volume Productions
• Final products assembled in production districts close to final consumers
• Lower needs of transport: economic and environmental savings

Considered a disruptive technology like the first printing machine (1450), steam engine (1750) and transistor (1950).
What’s is going on .... 
... from Industry 1.0 to Industry 4.0
Towards Intelligent Environments based on the Internet of People, Things and Services.
How can we imagine a Smart Factory according to Industry 4.0?

**Smart means: Adapt, Communicate and Interact**

**Cyber-Physical Systems**
- Are communicating with each other and with the environment
- Are configuring themselves (Plug and Produce)
- Are storing information

De-centralized self-organization in real-time
Plants are interconnected in order to smoothly adapting production schedule among smart factories!
The product as an information container

- The product carries information across the complete supply chain and its lifecycle

The product as an agent

- The product carries affects its environment

The product as an observer

- The product monitors itself and its environment
Adaptive Grasping and Smart Product Assembly

Stereo Cameras in the Head and a 3D Camera on the Torso for Approaching an Object

Reading Size, Weight and Lifting Points from the Product Memory with an antenna in the left hand – The Robot gets instructions from the product being produced in the CPPS
Industry 4.0: Robots are no Longer Locked in Safety Work Cells but Cooperate with Human Workers

Today

A new generation of light-weight, flexible robots collaborate with humans in the smart factory

Tomorrow
Human-Centered CPS-based Assistance Systems for the Smart Factory

- Physical Assistance by Exoskeletons
- Mobile, Personalized, Situation-Adaptive, Tutoring Systems
- Multimodal Human-Machine Interaction
- Location-based Maintenance and Planning Assistance
- AR/VR/DR-Assistance in Complex Work Processes
- Context-adaptive Assistance for Fault Diagnosis
EU Industrial Challenges

NON Technological Issues

Image of Manufacturing
Holistic approach in R&D and industry transformation
Sustainability Issues

Innovation and Project Fin.
Teaching Factory
University / Industry Education

(*) Survey on 23 National Technological Platforms of ManuFuture
EU Societal Challenges in ‘Horizon 2020’

Ethic Commitments and Opportunity of Growth

<table>
<thead>
<tr>
<th>Healthy Aging Society</th>
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<tr>
<td>Workforce Aging</td>
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<tr>
<td>Global Security</td>
</tr>
</tbody>
</table>

Industrial Engineering could play a central role to tackle Societal Challenges!
Population Aging in the EU

- IE for Health-care Systems:
  - Analyzing Hospital Processes
  - Drug Logistics
  - De-Hospitalization Process
  - Remote Control and Diagnosis of Patients by IoTs
  - Long care assistance for aged and disabled people

<table>
<thead>
<tr>
<th></th>
<th>Nowadays</th>
<th>2060</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>MLE [years]</td>
<td>75.7</td>
<td>82.1</td>
</tr>
<tr>
<td>ODR</td>
<td>25.40%</td>
<td></td>
</tr>
</tbody>
</table>

MLE: Mean Life Expectancy
ODR: Old age Dependency Ratio

ODR = (people ≥ 65 years) / (people 15÷64 years)
Work Force Aging in the EU

IE new models for aged workers:
• WTM for Aged Workers
• Job Rotation Policy
• OR & Ergonomics

New Ergonomic Standards
(in the view of Workforce Aging)

The ‘2007’ vs. ‘2017’ distributions of workers’ age at the BMW plant in Dingolfing (G)
World market of clean production technologies is expected to grow:

from 380 bn euro (2007 estimate) 765 bn euro (2020 estimate)  
(EU Commission, 2012)
Future Energy Networks

• Todays’ energy infrastructures are approaching their expected life.

• Over 60 % of energy demand is concentrated in Cities (*).

• Around 75 % of EU population lives in urban areas responsible for 80 % of energy consumptions and global warming gas emissions (**).

(**) Antonio Tajani, vice-President 2012 of the European Commission, Responsible for Industry and Entrepreneurship
Future Energy Networks

Energy District

Input Energy Carriers:
Fossil / Renewable Energy Sources

Energy Hub

Energy Interconnector

Output Energy Carriers

Energy Storage System
(Electrical/Thermal/Chemical/Mechanical)
Urban and Industrial Symbiosis

Eco-town program in Japan:
- 26 eco-towns
- 61 new recycling projects
- 107 new recycling facilities
- 1.65 bn euros
Industry 4.0: Smart, Green, and Urban Production

Smart Production
High-precision, superior quality production of high-mix, low volume smart products

Green Production
Clean, resource-efficient, and sustainable

Urban Production
Smart Factories in the city close to the employees’ homes
Research Award to:

Minimizing Carbon-footprint of Municipal Waste Separate Collection Systems

- Giovanni Mummolo
- Giorgio Mossa
- Salvatore Digiesi
- Giancarlo Caponio
- Rossella Verriello

Department of Mechanics, Mathematics and Management – Polytechnic of Bari
Social-Cyber-Physical System for Planning and Managing an Integrated Municipal Solid Waste in a Smart City

(Waste 4.0 Life Project under submission)
The smart city model

Citizen

City utilities

Urban Control Center

City Government

Urban Sensor Networks

ICT Networks

Open Data

Smart Services

Energy Grids (electr/thermal)
Buildings
Mobility
Public Lighting
Water Waste

Resources on demand

RES NOVAE Research Project (Italian Ministry of University and Research)
Global Security

- Intentional and Unintentional Events
- Industrial Sites
- Gas / Oil Pipelines
- ...
- Urban Infrastructures: ports, airports, railway stations
- Cultural Heritage Assets: Museums, churches, archeological sites,…
- New Professionals: Data scientist; Cyber Safety Guards.
A Survey on Industry Needs vs. University Curricula
The Institute of Industrial Engineers (IIE) [http://www.iienet2.org/]:
"Industrial engineering is concerned with the design, improvement and installation of integrated systems of people, materials, information, equipment and energy. It draws upon specialized knowledge and skill in the mathematical, physical, and social sciences together with the principles and methods of engineering analysis and design, to specify, predict, and evaluate the results to be obtained from such systems."

IESE project (Industrial Engineering Standards in Europe) [http://www.iestandards.eu/]:
“The branch of engineering that engages in the study of how to describe, evaluate, design, modify, control and improve the performance of complex systems, viewed over time and within their relative context."
# Industrial Engineering Educational Programme (IEEP)

## Mftg System Eng.:  
- Mass - Batch – Job production / FMSs / GT  
- Lean Production  
- Automation  
- Maintenance  
- ...

## IE Fundamentals:  
- Engineering Basics: (maths, physics, statistics & prob)  
- IT Basics  
- Work Measurement  
- Processes  
- Workplace Evaluation  
- Logistics  
- Organization Developments

## Operations Research:  
- Modeling Techniques  
- Mathematical Programming  
- Algorithms  
- Statistics  
- ...

## Mgmt System Eng.:  
- Quality Management  
- Project Management  
- Mgmt Information Systems  
- Contract Management  
- Health & Safety Management  
- Business Ethics  
- Cross Cultural Management

## Human Factors Eng.:  
- Ergonomics  
- Human Interface Eng.  
- Behavioural Science

ILO: International Labor Organization

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Curitiba (Brazil)  
7-10 October 2014
Industrial Engineering Standard in Europe (IESE) Project

**Operations Research:**
- Modeling Techniques
- Mathematical Programming
- Algorithms
- Statistics
- ...

**IE Fundamentals:**
- Engineering Basics: (maths, physics, statistics & prob)
- IT Basics
- Work Measurement
- Processes
- Workplace Evaluation
- Logistics
- Organization Developments

**Mgmt System Eng.:**
- Quality Management
- Project Management
- Mgmt Information Systems
- Contract Management
- Health & Safety Management
- Business Ethics
- Cross Cultural Management

**Innovation & Tech:**
- Innov. Process & Life Cycle
- Speed of Tech. Develop.
- Mftg. Technologies
- Information Technology
- Nano / Bio Technology

**Human Factors Eng.:**
- Ergonomics
- Human Interface Eng.
- Behavioural Science

**Environment & Sustainability:**
- Policies & Standards
- Energy Mgmt and Auditing
- Sustainable Tech. (solar, ...)
- Building Mgmt Systems
- Lighting / HVAC
- ...

**Major Educational Gap (Survey on Industry)**

ILO: International Labor Organization

Mftg System Eng.:
- Mass - Batch – Job production / FMSs / GT
- Lean Production
- Automation
- Maintenance
- ...

08/10/2014
Industry 4.0 vs. CIM 2.0: new IT competence required

Main idea:
- Holistic consideration of a company’s value creation processes and support by integrated IT-systems;
- Continuous computer-aided information processing, based on an inter-departmental data base (CAD/CAM; flexible manufacturing systems).

Goal: unmanned factory

Human Role: planning and monitoring

“The perspective of a completely automated and unmanned factory cannot represent a realistic perspective because of technological and economical reasons.” Prof. Dr. Hirsch-Kreinsen

New enablers and New Competence required:
Internet technology, data collection storage and processing

Technical innovations shall not be considered isolated. A more integrated view of technical, organizational and personal aspects has to be considered as a socio-

The human role within the production is still very important!
Competence deficit

- **INDUSTRY 4.0 leap**
- **synchronous process of complexity and competences**
- **asynchronous development leads to competence deficits**

**Curitiba (Brazil)**
7-10 October 2014
Reduction of PhD Workforce:

The Negative Loop Phenomenon in Knowledge Generation / Exploitation

Issue:
Skill Gap of Science, Technology, Engineering, and Maths (STEM) Workers

- 67% of US Manufacturers suffers from moderate-severe shortage of Skilled Workers (National Association of Manufacturers, 2013)
- Germany suffers from 210,000 Maths, Computer Science, Natural Sciences and Technology (MINT) workers (Deutsche Bank Research, 2011)
- UK needs of 100,000 STEM workers (Royal Academy of Engineering, 2012)
- 36% of European Companies of EU-27 encountered troubles in hiring skilled workforce (European Company Survey of Eurofond, 2009)
- In Industry, 60% of skill shortage in technical or engineering fields (The Economist Intelligent Unit, 2012)

Skill Gap Causes in Europe

- Reduction of New Skilled Workforce into the R&D System
- Skill Obsolescence due to Workforce Aging and Changing Nature of Work
- Educational Gap: Mismatch between Institutional Education and Industry Needs

Recession and R&D Funding Cut

PhDs tend to leave University and search for industry positions

PhDs over-qualification and de-motivation

Expected Reduction in Talented Research People

Quality Reduction of R&D and HE Ss.
A New Model of Doctoral Education in Industrial Engineering

**Solutions for EU from the Salzburg Principles I, II (2005 – 2010), (EUA, Council for Doctoral Education)**

Main outcome of doctoral education (Guidelines):

The ‘T-shaped’ 3rd Level educational model
‘Early stage Researcher’ with Knowledge Exploitation Capability. Less interest in PhD thesis results (expertise in very few domains).

Knowledge Exploitation & Transfer require:

**Forward an Holistic view of the R&D and Education: The ‘University / Industry’ System**

The Role of the European Academy on Industrial Management in conceiving a new BoK of IE (Master on ‘Advanced IE & M’, Summer School on IE & M, ...)

The ‘European School of Industrial Engineering’ as an European Multi-University Collaborative Network.

<table>
<thead>
<tr>
<th>(%) Researchers in Business Sectors</th>
<th># Researchers/1000 x labor force</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU 27</td>
<td>46</td>
</tr>
<tr>
<td>Japan</td>
<td>68</td>
</tr>
<tr>
<td>US</td>
<td>79</td>
</tr>
</tbody>
</table>

- More Industry PhDs in EU
- Stimulate demand for high-skilled jobs (KETs)
• **Origin and Evolution**

• **1982:** Technical Faculties of German Universities agreed on the need of updating IE competence.

• **1984:** First nucleus of AIM consisted of 14 EU Universities: European Academy for Technical Plant Management (EHTB).

• **Nowadays:** Representatives of 34 Universities of 22 European Countries of EHEA.

http://www.europe-aim.eu/
Map of European Countries (blue colored) represented in the European Academy for Industrial Management

http://www.europe-aim.eu/
Vision of AIM

- AIM pursues to be the leading European Academy developing and promoting education and research in the field of Industrial Engineering and Management (IE&M).
- As such, it endeavors to gather full professors in this field from all corners of the European Higher Education Area (EHEA).
- IE&M education is promoted by classical and modern approaches including problem solving, case study as well as co-creative education. Active learning, instead of teaching, is the preferred point of view of AIM.

http://www.europe-aim.eu/
Recent Activities of the European Academy for Industrial Management (AIM)

• Special Issue on: ‘Sustainable Manufacturing’ published in 4th number in 2013 of “Management and Production Engineering Review”

• 36th AIM Annual Conference on “Advances in Cyber-Physical Systems”, S. Petersburg, 18-21 September 2014


• 37th AIM Annual Conference on “Human Centered Production in Cyber-Physical Production Systems for Industry 4.0” Vienna, 17-20 September 2015

http://www.europe-aim.eu/
Recent Activities of the European Academy for Industrial Management (AIM)

- AIM Master on 'Advanced Industrial Engineering and Management': *To be jointly designed and offered by EU Universities and Companies* ("Erasmus +" Program, deadline April 2015)

- European School of Industrial Engineering: A New Model for the European University (MoU between EU Universities and Companies)

- MoU between AIM and ABEPRO (Malaga, 23 July 2014)

- MoU between AIM and The Institute of Industrial Engineers (IIE), preliminary phase.
Memorandum of Understanding

Malaga, July 23, 2014
Signing the AIM – ABEPRO Memorandum of Understanding

President Milton Vieria Junior for ABEPRO
and
President Giovanni Mummmolo for AIM

Article 1. Purpose of the Memorandum of Understanding
AIM and ABEPRO cooperate in scientific and educational activities for knowledge development in the fields of Industrial Engineering, including Industrial Management and Production Engineering, by international mobility projects for students and professors, research projects, and any other similar initiatives jointly or independently proposed and developed by both AIM and ABEPRO on the basis of specific agreements.
Forward the European School of Industrial Engineering

Vision
• A Multi-University System promoted by European Academic Institutions of the EHEA and Industry to bridge the gap between IE academic competence and industry needs with the common aim of preparing skilled and creative workforce providing effective answers to major grand challenges of the EU.

Mission
• MS and PhD courses with specialty on different IE subjects
• Academic and Executive IE Curricula conceived by U & I
• Scientific Symposia and Executive Workshops

by
• Coupling Theoretical and Experiential Learning Approaches
• Sharing Educational Materials and Best Practice
• Privileging the Learning instead of the Teaching point of view
Forward the European School of Industrial Engineering and Management: The Basic Reference Model

European Academy for Industrial Management
Schools of Engineering of 34 European Universities of 22 European Countries

Certified Curricula and Modules to integrate (not substitute) 2nd and 3rd level University curricula on Industrial Engineering & Mgmt.

EU University System
Recognition of curricula and/or modules offered by ESIEM as part of 2nd and 3rd Level University degrees delivered by EU Universities.

Body of Knowledge on Industrial Engineering and Management
An European Reference for Schools of Engineering and Industry.

European Industrial stakeholders
- Companies
- Industry Associations
- Unions
- Technical Associations
- Other Stakeholders

Certified Executive Curricula or Modules on Industrial Engineering & Mgmt.

EU Industry System
Conclusions

1. World Wide Competition should be more and more based on “Talents Driven Innovation”

2. Industrial and Societal Challenges in the EU will contribute on Economic Growth and Jobs’ Creation

3. IE Competence require to be updated with major focus on:
   I. Innovation Exploitation and Technology Management
   II. Societal Challenges of interest for IE (e.g. Workforce Aging and Sustainable Urban Development)
   III. IT for Implementing Social – Cyber Physical Systems in Smart Factories as well as in Smart Cities

4. Education and Networking
   I. Dual University – Industry IE Education
   II. Teaching Factory and Experiential Learning
   III. European Multi-University Collaborative Network

5. The Role of the European Academy for Industrial Management
   I. Educational projects as well as scientific activities are promoted.
   II. Main focus on education of Industrial Engineers for Industry challenges; the Academy is being paid a growing attention also to societal challenges.
   III. Multi-University Academy projected in the EHEA.
Building the future by innovation!

„Insanity is to do the same things over and over and expect different results.“

Albert Einstein, Physiker (1879 - 1955)