# Project meeting 5: Perugia (IT)

## Agenda

### MON, Jun 3rd 2019

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Partner(s) involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>All day</td>
<td>Arrival in Perugia</td>
<td>All</td>
</tr>
</tbody>
</table>

### TUE, Jun 4th 2019

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Partner(s) involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:45</td>
<td>Greet and meet at TUCEP&lt;br&gt;Via Martiri 28 Marzo, 35; 06129 Perugia</td>
<td>All</td>
</tr>
<tr>
<td>09:00</td>
<td>Welcome and official opening of project meeting</td>
<td>P7/TUCEP, P1/FHM</td>
</tr>
<tr>
<td>09:05</td>
<td>Presentation of / agreement on agenda</td>
<td>P3/E.N.T.E.R.</td>
</tr>
<tr>
<td>09:15</td>
<td>Brief presentation of the partners achievement in the project during the last 12 months (each partner reports for 5 minutes; no ppp needed)</td>
<td>Partner teamleader</td>
</tr>
<tr>
<td>10:45</td>
<td>Coffee break</td>
<td></td>
</tr>
<tr>
<td>11:00</td>
<td>General Status of project</td>
<td>P1/FHM/Manfred</td>
</tr>
<tr>
<td>11:30</td>
<td>WP3: SmEArt model and guidelines (Result 5) Current status of guidelines editing, translation and distribution</td>
<td>P1 / FHM / Philipp</td>
</tr>
<tr>
<td>11:45</td>
<td>WP3: SmEArt Learning, Exchange and Networking Platform (Result 8) • Status • Next steps • Acquisition of users • Evaluation so far and in future by Peer 1 &amp; 2, Evaluation results to be presented by Borut</td>
<td>P1/FHM/ Philipp</td>
</tr>
<tr>
<td>12:30</td>
<td>Lunch</td>
<td></td>
</tr>
<tr>
<td>13:00</td>
<td>Visit at Umbra Group, an associate partner of TUCEP&lt;br&gt;<a href="https://www.umbragroup.com/en/">https://www.umbragroup.com/en/</a>&lt;br&gt;Via V. Baldaccini 1, 06034 Foligno - Italy&lt;br&gt;Please note it is a 40km drive to the company therefore please bring your cars and navigation systems to the meeting place – we leave all together after lunch!</td>
<td>all</td>
</tr>
<tr>
<td>19:00</td>
<td>Joint dinner [venue communicated directly at meeting]</td>
<td>all</td>
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</table>

### WED, Jun 5th 2019

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Partner(s) involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00</td>
<td>WP3: Pilot-General status / introduction</td>
<td>P1 / FHM / Manfred/Germany: Manfred &amp; Martin/Belgium: KU Leuven/Italy: Uni Perugia</td>
</tr>
<tr>
<td>09:15</td>
<td>WP3: Status Pilot detailed - country co-ordinators presentation &lt;br&gt;Each country co-ordinator presents the current consulting status of 3 companies per county in depth (including Stress Test Maturity level, planned measures, achieved results, next steps (10 min per company) based on evaluation forms</td>
<td>Slovenia: Uni Primorsko/Spain: FVEM/Netherlands: Parbleu</td>
</tr>
<tr>
<td>10:45</td>
<td>Coffee break</td>
<td></td>
</tr>
<tr>
<td>11:15</td>
<td>WP3: Status Pilot detailed status: &lt;br&gt;Each country co-ordinator presents the current consulting status of 3 companies per county in depth (including Stress Test Maturity level, planned measures, achieved results, next steps (10 min per company)</td>
<td>P1 / FHM / Manfred</td>
</tr>
<tr>
<td>12:45</td>
<td>Pilot summary and next steps &lt;br&gt;What have we learned from consulting? How to improve Guidelines?</td>
<td>P11 / Uni Primorsko / Borut &amp; Peter</td>
</tr>
<tr>
<td>14:00</td>
<td>WP3 evaluation results so far / status of other project evaluation processes</td>
<td>P11 / Uni Primorsko / Borut &amp; Peter</td>
</tr>
<tr>
<td>14:45</td>
<td>WP6: Administration, financial and management issues • Overview over financial reports I-III • Consistency working units reported vs. performance in project • Deductions for the final project months • AOB</td>
<td>P1/FHM/P3/ENTER</td>
</tr>
<tr>
<td>15:45</td>
<td>WP5: Dissemination and exploitation work: &lt;br&gt;• Implementation of social media strategy (Result 16) • Maintenance of project website (Result 14) • Publications and print/online media appearance (Result 19) • Cooperation with major national initiatives (Result 21) • Presentation at professional conferences and fairs (Result 22) • Awareness raising seminars in all partner countries (Result 23)</td>
<td>P1/FHM/P3/ENTER</td>
</tr>
<tr>
<td>19:00</td>
<td>Joint dinner [venue communicated directly at meeting]</td>
<td>all</td>
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</table>
**THU, Jun 6th 2019**

<table>
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<tbody>
<tr>
<td>09:00</td>
<td>Project Conference and final meeting</td>
<td>P1 / FHM / Manfred</td>
</tr>
<tr>
<td></td>
<td>Organisation of international dissemination conference in connection with</td>
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<td></td>
<td>the final project meeting in B (as stated in the proposal)</td>
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<tr>
<td>10:00</td>
<td>WP7: Quality Management and Project Monitoring</td>
<td>P3 / ENTER</td>
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<tr>
<td></td>
<td>• Status quo</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Deviations from project plan</td>
<td></td>
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<tr>
<td>10:30</td>
<td>Coffee</td>
<td>all</td>
</tr>
<tr>
<td>10:45</td>
<td><strong>Industry 4.0 in Italy - scientific presentation of an Italian expert</strong></td>
<td></td>
</tr>
<tr>
<td>11:15</td>
<td>„Practical Smart Engineering from a management point of view“ The</td>
<td>P1 / FHM / Manfred</td>
</tr>
<tr>
<td></td>
<td>publishing - title, concept and publisher</td>
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<tr>
<td>12:00</td>
<td>Concluding summary of the results of the meeting and outlook on the next</td>
<td>P1 / FHM / Manfred</td>
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<tr>
<td></td>
<td>steps, AOB</td>
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<tr>
<td>12:30</td>
<td>Steering commeting meeting</td>
<td>All</td>
</tr>
<tr>
<td>13:00</td>
<td>End of meeting</td>
<td>All</td>
</tr>
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### Participants

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Representatives</th>
<th>Organisation</th>
<th>Representatives</th>
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</thead>
<tbody>
<tr>
<td>P1/DE/FHM</td>
<td>Manfred Leisenberg</td>
<td>P9/IT/UNIPG</td>
<td>Roberto Marsili</td>
</tr>
<tr>
<td></td>
<td>Marianna Gevorski</td>
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<tr>
<td></td>
<td>Philipp Kronsbein</td>
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<tr>
<td>P2/DE/Interrogare</td>
<td>-</td>
<td>P10/SI/CCIS</td>
<td>Nina Vrabelj</td>
</tr>
<tr>
<td></td>
<td>+36643807754</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P4/DE/IPH</td>
<td>Martin Westbomke</td>
<td>P12/ES/FVEM</td>
<td>Joseba M. Sainz de Baranda</td>
</tr>
<tr>
<td></td>
<td>Benjamin Küster</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P5/BE/KUL</td>
<td>Philippe Saey</td>
<td>P13/NL/Parbleu</td>
<td>Sandra Verweij</td>
</tr>
<tr>
<td></td>
<td>Geert De Lepeleer</td>
<td></td>
<td>José Laan</td>
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<tr>
<td></td>
<td>Dimitri De Schuyter</td>
<td></td>
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<tr>
<td>P6/BE/VOKA</td>
<td>Elis Delaere</td>
<td>P14/SI/ATech</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Viola Vandelanotte</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P7/IT/TUCEP</td>
<td>Gianluca Rossi</td>
<td>P15/BE/Pitz</td>
<td>Renaat Vandelanotte</td>
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<tr>
<td></td>
<td>Debora Ercoli</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P8/IT/Dimension4</td>
<td>Andrea Bucci</td>
<td></td>
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INDUSTRY 4.0 — DEFINITION

Name origin: 2011 Hannover expo

With the definition “Industry 4.0” we mean the trend towards industrial automation, the interconnection of supplier machinery and the supply chain, the generation and analysis of large amounts of data

- This definition is applied only if the subject is a company, not a “natural person”
- The first definition of Industry 4.0 was implemented for manufacturing industry. Now the concept is extended to every company: the (smart) Factory is “…the physical place where value is generated” (Services, vending machines, healthcare field…)
INDUSTRY 4.0: 4TH INDUSTRIAL REVOLUTION

1. Mechanization
   - Steam engines
   - Water/steam power
   - New manufacturing
   - Iron production
   - Textile industry
   - Mining and metallurgy
   - Machine tools
   - Steam factories

2. Technological
   - Electrification
   - Production line
   - Mass production
   - Globalization
   - Engines/turbines
   - Broad adoption of telegraph, gas, water supply

3. Computer / Internet
   - Digital manufacturing
   - PLC/Robotics
   - IT and OT
   - Digitization
   - Automation
   - Electronic/digital Networks
   - Digital machines

4. Convergence IT / OT
   - Autonomous machine
   - Advanced robotics
   - Big Data/Analytics
   - Internet of Things
   - Digital ubiquity/Cloud
   - Smart factory
   - Machine learning & AI
   - Cyber Physical
INDUSTRY 4.0: THREE MAIN TECHNOLOGICAL AREAS

1. Digital data availability and Big Data Analytics: big data elaborations, low-cost, cloud computing, process virtualization, fast prototyping and AI

2. Robotics and advanced automation: costs, production errors and time reduction

3. High connectivity level: internet of things application in the value chain
INDUSTRY 4.0 — MAIN TRANSFORMATION GUIDELINES

1. **Interconnection**: asset ability of exchanging information with internal (e.g. ERP, CRM systems, etc.) and/or external (customers, suppliers, partners, supply chain, etc.) systems

2. **Virtualization**: digital twin of a real system for the forecast of the system evolutions through simulations. The combination of the physical components with their digital twins is the cyber physical model which allows costs and time reduction

3. **Decentralization**: Cyber-physical components have self-diagnosis strategies

4. **Remote interaction**: devices are remotely accessible. Information on the system behavior can be retrieved and corrective actions can be implemented

5. **Real time elaborations and reactions**: functions for real time data mining and implementation of reactions
INDUSTRY 4.0 – KEY ENABLING TECHNOLOGIES (KET)

- **Advanced Manufacturing Solutions**
  - Autonomous, cooperating industrial robots
  - Numerous integrated sensors and standardized interfaces

- **Additive Manufacturing**
  - 3D printing, particularly for spare parts and prototypes
  - Decentralized 3D facilities to reduce transport distances and inventory

- **Augmented Reality**
  - Augmented reality for maintenance, logistics, and all kinds of SOP
  - Display of supporting information, e.g., through glasses

- **Simulation**
  - Simulation of value networks
  - Optimization based on real-time data from intelligent systems

- **Horizontal/Vertical Integration**
  - Cross-company data integration based on data transfer standards
  - Precondition for a fully automated value chain (from supplier to customer, from management to shop floor)

- **Industrial Internet**
  - Network of machines and products
  - Multidirectional communication between networked objects

- **Cloud**
  - Management of huge data volumes in open systems
  - Real-time communication for production systems

- **Cyber-security**
  - Operation in networks and open systems
  - High level of networking between intelligent machines, products, and systems

- **Big Data and Analytics**
  - Full evaluation of available data (e.g., from ERP, SCM, MES, CRM, and machine data)
  - Real-time decision-making support and optimization
**INDUSTRY 4.0 IN EUROPE**

<table>
<thead>
<tr>
<th>Country</th>
<th>Fiscal regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italy</td>
<td>Super-amortization for new assets “Iper”-amortization for industry 4.0 assets</td>
</tr>
<tr>
<td>France</td>
<td>Super-amortization for industry 4.0 machineries</td>
</tr>
<tr>
<td>Germany</td>
<td>None</td>
</tr>
<tr>
<td>Spain</td>
<td>None</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Fast amortization</td>
</tr>
</tbody>
</table>

In Italy Industry 4.0 is a **National Strategic Plan**

Italy has the best scenario for Industry 4.0 investments (tangibles/intangibles).

This condition can be interesting also for **re-shoring** strategies.
THE ITALIAN SCENARIO — INCENTIVES IN INNOVATION INVESTMENTS

- Credit tax for R&D investments: from 25% to 50%
- Credit tax for investments in innovative SME and start-ups
- “Sabatini law” for investments (3,575% up to 2M€ investments)
- “Patent box”, optional tax regime related to exploitation of intellectual property
- Super-amortization: 30% for new assets (tangibles)
- Iper-amortization for industry 4.0 assets (tangibles/intangibles):
  - 170% for investments up to 2.5M€
  - 100% for investments from 2.5M€ to 10M€
  - 50% for investments from 10M€ to 20M€
  - (140% intangibles)

Amortization measures are not tax credits and are incompatible with R&D tax credits

Amortization measure can instead be combined with contributions (POR-FESR measures, Sabatini law, etc)
THE ITALIAN SCENARIO
AMORTIZATION + CONTRIBUTIONS: AN EXAMPLE

Theme: Purchase of innovative machinery for 1M€

Incentive:

- POR FESR 2014-2020 Umbria region investments contributions program: 30% contribution
- Sabatini law: 3,575 % contribution
- Iper-amortization measure: saving on IRES FLAT TAX of 24% on 170%

These two measures are compatible

- POR-FESR contribution: 30%(1M €) = 300 k€
- Sabatini law contribution: 3,575% (1 M€) = 36 k€
- Iper-amortization benefit: 24%(170%(1M€))=24%(1.7M€) = 408 k€
The assets eligible to iper-amortization are:

1. Instrumentals assets controlled by computers or by sensors and actuators
2. Quality and sustainability systems
3. Devices for human-machine interaction and for the ergonomics and safety improvement
THE ITALIAN SCENARIO — IPER-AMORTIZATION REQUIREMENTS (1)

The assets need to satisfy all the following 5 characteristics in order to be eligible to iper-amortization:

1. CNC (Computer Numerical Control) and/or PLC (Programmable Logic Controller) control
2. Inter-connection to IT systems and possibility of interaction with instructions or part program
3. Automatic integration with logistic system or with supply network and/or with other machines
4. Simple and intuitive frontends
5. High standards in safety, health and hygiene
THE ITALIAN SCENARIO — IPER-AMORTIZATION REQUIREMENTS (2)

Furthermore the assets need to satisfy at least 2 of the following 3 characteristics:

1. Remote maintenance systems and/or remote diagnosis and/or remote control
2. Continuous condition monitoring through appropriate sensors and adaptivity to the process evolution
3. Cyber-physics systems: integration between physical assets and behavior simulation during process evolution
INDUSTRY 4.0 – VIRTUOUS INVESTMENTS STRATEGIES
INDUSTRY 4.0 – VALUES FOR COMPANIES

Industry 4.0 investments

Technology value

Data value
With Industry 4.0 technology it is possible to achieve the following objectives:

- **Flexibility**: possibility of small quantities productions with the same costs of large scale production
- **Velocity**: in prototyping and mass production with new technologies and low set-up and goto-market time
- **Productivity**: through costs and waste reduction (defects and errors detection); reliability and quality increase
- **Integration**: of supply chains with logistic and supplying systems improvements
- **Safety**: errors and accident reduction, better ergonomics and work quality conditions
- **Sustainability**: energy, raw materials consumption and polluting emission reduction
- **Product innovation**: new digital technologies allows to develop new business models based on smart products
Interconnection system improves the global productivity with the reduction of time to market, error minimization and quality enhancement.

Interconnection system can be implemented in two ways:

- **Central software interconnection**: every machine transmit information to the central control software; the material handling is controlled by the central information control.

- **Machine-to-machine (M2M) interconnection**: every machine transmit information to the next machine in the supply chain; the material handling is controlled at every step from information flux between the machines.
INDUSTRY 4.0 — TECHNOLOGY VALUE: THE LAUNDRY EXAMPLE

CENTRAL SOFTWARE INTERCONNECTION
INDUSTRY 4.0 – TECHNOLOGY VALUE: THE LAUNDRY EXAMPLE

M2M INTERCONNECTION
INDUSTRY 4.0 – TECHNOLOGY VALUE: THE LAUNDRY EXAMPLE

CONTINUOUS WASHING MACHINE
INDUSTRY 4.0 — TECHNOLOGY VALUE: THE LAUNDRY EXAMPLE

PLC SYSTEM
INDUSTRY 4.0 – THE LAUNDRY EXAMPLE
ETHERNET INTERCONNECTION SYSTEM
INDUSTRY 4.0 — TECHNOLOGY VALUE: THE LAUNDRY EXAMPLE

MONITORING

Bag emptying monitoring with software Skema

PLC data monitoring
INDUSTRY 4.0 — TECHNOLOGY VALUE: THE LAUNDRY EXAMPLE

USER INTERFACE

Work process evolution

Work process details
INDUSTRY 4.0 – DATA VALUE
INDUSTRY 4.0 — DATA VALUE: DSS EXAMPLE

Case study: Wide area with complex orography and high density human presence

The problem: Rainfall and water flux forecast in order to avoid flood

Physical systems: Sewerage system with sensors, pluviometers, water level sensors

Cyber physical system: Hydrological and weather simulations

With data from sensors and simulations is possible to develop a DSS system
Flood control and prevention

Based on weather monitoring and nowcasting, a combination of physical, black box and GIS models is used to estimate the upcoming discharges and simulate the flooded areas.
Flood control and prevention

The data provided by the weather monitoring system and the user's network feed the hydraulic/hydrological models. Following the exceeding of alert levels related to possible flooding scenarios, the DSS suggests the best mitigation strategies (close / open gates, etc.)
Decision Support Systems

The goal is achieved with the help of interactive Decision Support Systems, receiving and showing all the monitored and forecasted data and suggesting the best intervention strategy based on optimization algorithms.
INDUSTRY 4.0 – DATA VALUE: DSS EXAMPLE
INTERACTIVE DECISION SUPPORT SYSTEM

GOALS

- NETWORK/SYSTEM BEHAVIOUR ANALYSIS
- HISTORICAL EVENTS SIMULATION AND REANALYSIS
- AUTOMATED DECISION SUPPORT SYSTEM DESIGN
- REAL TIME STRATEGIES PLANNING BASED ON FORECAST MODELS

INTERACTIVE DECISION SUPPORT SYSTEM

- METEOROLOGICAL DATA VISUALISATION
- ALERT SYSTEM
- OPERATIVE STRATEGIES
- POST-EVENT SIMULATIONS FOR MODEL CALIBRATION

HISTORICAL TIME-SERIES
REAL TIME DATA
FORECASTS
INDUSTRY 4.0 – DATA VALUE: DSS EXAMPLE

OPERATIVE TOOLS

WEATHER DATA COLLECTION FROM GROUND GAUGES AND RADARS

NOWCASTING FROM INNOVATIVE MODELS

SCADA DATA COLLECTION

HYDRAULIC/HYDROLOGICAL MODELS

BLACK BOX MODELS

OPTIMISATION ANALYSIS
**INDUSTRY 4.0 — DATA VALUE: DSS EXAMPLE**

**APPLICATION FIELDS**

<table>
<thead>
<tr>
<th>Field</th>
<th>Image</th>
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<tbody>
<tr>
<td>Flood/Landslide Risk Mitigation &amp; Prevention</td>
<td><img src="image1.jpg" alt="Image" /></td>
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<td>Sewer Systems Management</td>
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<tr>
<td>Wastewater Treatment Plants</td>
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<td>Storage Tanks Management</td>
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<td>Precision Agriculture / Smart Irrigation</td>
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<td>Smart Urban Planning</td>
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<td>Climate Changes Adaptation</td>
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<td>Emergencies Management</td>
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**STAKEHOLDERS**

- Civil Protection
- Local Administrations
- Insurance Companies
- Utility Companies
- Water Treatment Companies
- Governments
- Disaster Management Institutions
- Water Management Companies
- River Authorities

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