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# Supervisor Expression of Interest
# MSCA-IF Marie Sklodowska Curie Action-Individual Fellowship

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| **Supervisor name:** | Luca Fumagalli |
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| Department Name:<br>Research topic:<br>(https://www.polimi.it/en/scientific-research/research-structures/departments/) | Department of Management, Economics and Industrial Engineering<br>*Industrial Engineering*<br><br>**Digital Twin development for Industry 4.0 production systems** |
| MSCA-IF Research Area Panels | CHE_Chemistry<br>ECO_Economic Sciences<br>X ENG_Information Science and Engineering<br>ENV_Environmental and Geosciences<br>LIF_Life Sciences<br>MAT_Mathematics<br>PHY_Physics<br>SOC_Social Sciences and Humanities |
| Politecnico di Milano Areas: | Cultural Heritage<br>Smart Cities<br>Territorial Fragilities<br>Health<br>X Industry 4.0 |
| Brief description of the Department and Research Group (including URL if applicable):<br><br>http://www.dig.polimi.it | The Department of Management, Economics and Industrial Engineering (DIG) of Politecnico di Milano was established in 1990. The Department's main mission is to impact on society by creating and sharing knowledge at the intersection between engineering, management and economics through outstanding research, top quality education and serving the community. DIG is one of the largest Departments of Politecnico di Milano, with around ninety tenured professors. DIG research aims to produce excellent science though a tailored approach characterized by multi-disciplinarity, mastering of multiple methodologies and intense connections with practitioners and policymakers.<br>The Department is part of the School of Management of Politecnico di Milano, established in 2003 together with MIP Politecnico di Milano Graduate School of Business which focuses on post-experience education. The School is EQUIS and AMBA accredited and ins ranked by Financial Times and QS among the best European Business Schools. The School is member of PRME, Cladea, ACE |

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| | and QTEM.<br>The Manufacturing Group of the School of Management of Politecnico di Milano is the research group involved in this project. The group has competences in the fields of ICT for Manufacturing, Social and Environmental Sustainability in Manufacturing, Product and Service Development, Manufacturing Systems Design, Production and Maintenance Management, Education in Manufacturing. The group can be considered the leader among the Italian Universities and Research Centers in the mentioned fields. The group has been involved in several European and international research projects such as InCoCo-S, Socrades, LeanPPD, ActionPlant, PlantCockpit, S-MC-S, MSEE, EMC2-Factory, IMC-AESOP, LinkedDesign, CTC, MAN-MADE, whiteR, Target, and ELICiT. Furthermore, it is very active in roadmap and technology foresights, where has been the coordinator of the IMS NoE and of the IMS2020 and partner of ActionPlanT, Pathfinder and So-Smart. The group is member of EFFRA and actively participates in the cPPP, contributing to the roadmapping at European level. The group has experience also in project coordination of Mari Curie – RISE projects (IMAPLA, SUSTAINOWNER). |

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| **Brief project description: (max 1 page)** | **Foreword:**<br>The Industry4.0Lab at the School of Management of Politecnico di Milano is an initiative on which are focused people and investments of Department of Economics, Management and Industrial Engineering of the School of Management of Politecnico di Milano, in an effort toward a multidisciplinary vision of production environments for the realization of a "teaching factory" for educational and research purposes. Since the beginning of 2014 a research program has been activated aimed at defining the paradigm of the Factory of the Future, which envisions highly reconfigurable, fully informed production systems, integrated in the overall logistics process and with the properties of product and service delivered according to the general framework of “Industry 4.0” initiative in Italy.<br>From a hardware perspective, the core of the Lab is constituted by the fully automated assembly and manufacturing line composed by: A robotic assembly cell (6-axis robot with 2 parallel conveyors, tools/grippers warehouse and exchanger, visual system and smart sensors, Two drilling spindles (ready for Cyber Physical Systems operations, like self-diagnosis and web visualization), A pneumatic press, An application module Camera Inspection, A manual station (with control panel for process synchronization).<br>From a software perspective: Manufacturing Execution System (MES) for the production management, Energy Management System for the consumption management, OPC-UA interface to read real-time data and collect them in dedicated data bases, Simulation Environment, Server Bridge Machine for the system remote control via Virtual Private Network (VPN), Cloud system.<br><br>**Research project focus:**<br>The research will focus on test and replicate virtually any variety of manufacturing and assembly system for discrete manufacturing. The research activity will leverage on the possibility to exploit data for operations management coming from different sources: individual logic (PLC), MES, local databases, etc., demonstrating how different solutions can impact on different possible industrial business scenarios. The research will thus focus on the definition of Digital Twin model to fully integrate the data coming |

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| | from the Lab infrastructure in order to deploy different demonstrations based on the CPS (Cyber Physical System) concept.<br>One key characteristic of cyber-physical systems is real time decision making based on data collected from the production system. In this scope, the laboratory activity will test how different solutions can impact on different production scenarios. This will result in a research activity that can have positive impact on running research project funded at European and national level, running research activity for pre-competitive research funded by companies and teaching activity at master of science and post-graduated level. |