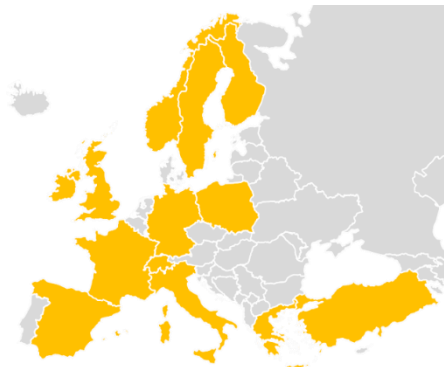


ACE Factories: humAn CEntred Factories Cluster - Enjoy reading our first newsletter!

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ACE Factories: humAn CEntred Factories Cluster is a networking Cluster of five FoF-4 projects funded under the European Union's Horizon 2020 research and innovation programme - [A4BLUE](#), [Factory2Fit](#), [HUMAN](#), [INCLUSIVE](#), and [MANUWORK](#). Based on the common goals they are working towards, the cluster is a forum for sharing projects' knowledge, progress, and results. Those projects are developing solutions for manufacturing work environments that adapt to each individual worker. By combining their efforts, the projects hope to achieve greater impact and wider adoption of these new developments in advanced manufacturing systems.



Countries covered by the projects' cluster

Our vision and mission



Smart and connected technologies are not only transforming how parts and products are designed, produced, used, and maintained, but also workplaces and workers, transforming organisations themselves in human-centred factories. Consequently, now, by introducing new technologies, industrial work is increasingly mediated; i.e. the work is not related to the physical objects but to their counterparts in the virtual world. But people remain central to operations. In the past, people were expected to adapt to machine requirements. Now, automation systems are being developed that can recognise the users, remember their capabilities, skills and preferences, and adapt accordingly. Humans and automation are therefore taking advantage of each other's strengths, having a symbiotic relationship for enhancing capabilities, skills and quality of their work. Workers get encouraging feedback of their wellbeing and competence development, taking responsibility of their own competence development with adaptive on-the-job learning tools. Adaptation can also make work organisation more flexible so that individual preferences are taken into account in task distribution. In short, new automation approaches, with workers at the centre, will complement people's capabilities and ensure higher performance, adaptability and quality. The result is more flexible, inclusive and safe workplaces, as well as better work conditions and increased productivity and improved quality. But, above all, this means increased worker satisfaction and work well-being, more empowered and engaged workers and increased interest towards factory work as a career, attracting young talented people.

ACE Factories presented at EFFRA Factories of the Future Community Day in Brussels



On 27th June, the humAn CEntred **Factories Cluster** was presented at EFFRA Factories of the Future Community Day in Brussels by Eija Kaasinen, Coordinator of the H2020 Project [Factory2Fit](#). The aim of the Community Day was to present and discuss the Factories of the Future 2019 call topics and to facilitate brokerage among the attendees. During the event existing Factories of the Future projects

were also be presented. Among those presentations, Dr Kaasinen presented the ACE Factories Cluster, illustrating its vision and five development paths towards human-centred factories, as well as examples of industrial cases developed in the framework of the five projects who joined the Cluster. Following our example, there was interesting discussion on the benefits of clustering and sharing experience, also in relation to the future funding programme, Horizon Europe.

UPDATES FROM THE PROJECTS

A4BLUE shows its use cases: watch the videos!



[A4BLUE](#) partners are working hard to develop new adaptive workplaces that respond to workers' profiles and to the changing manufacturing environment.

Therefore, A4BLUE will introduce adaptive automation mechanisms for an efficient and flexible execution of tasks, ensuring a constant and safe human-machine interaction as well as personalised worker assistance systems including virtual/augmented reality and knowledge management capabilities to support them in the assembly and training related activities. The A4BLUE solution is being tested and validated in real industrial scenarios (AIRBUS and CESA) and in lab scenarios (IK4-TEKNIKER and RWTH Aachen). The impressive results are now shown in three videos available at: <https://vimeo.com/a4blue>. For the [AIRBUS scenario](#), A4BLUE will provide a fully traceable quality process improvement for a specific set of assembly personnel including operators, quality supervisors, manufacturing engineers, and process planners. This will be done by introducing a new intelligent system for bolt tightening in hydraulic assembly, involving a Smart Torque Wrench (jointly developed between Airbus and SamOutillage) connected with an Augmented Reality Device (Hololens). For the CESA use case scenario, A4BLUE will introduce the first collaborative automation in their assembly facilities, which will reduce the high dependency on manual work within CESA and allow workers to use their time in a better and less exhausting way. In addition, an AR device will also be implemented to provide a new friendlier and easier way of presenting information to the workers as a complete source of guidance, solving the current problem of fragmented information.



The [scenario at IK4-TEKNIKER](#) is the collaborative assembly of a latch valve in a fenceless environment, including auxiliary activities as initial preparation activities, final inspection and transport of the completed part to the warehouse. The scenario is aligned with the need for incorporating robots that are able to safely and adaptively co-operate with humans in operations that have been until now mostly manual. Within the [RWTH use case](#) the A4BLUE solution will be applied to

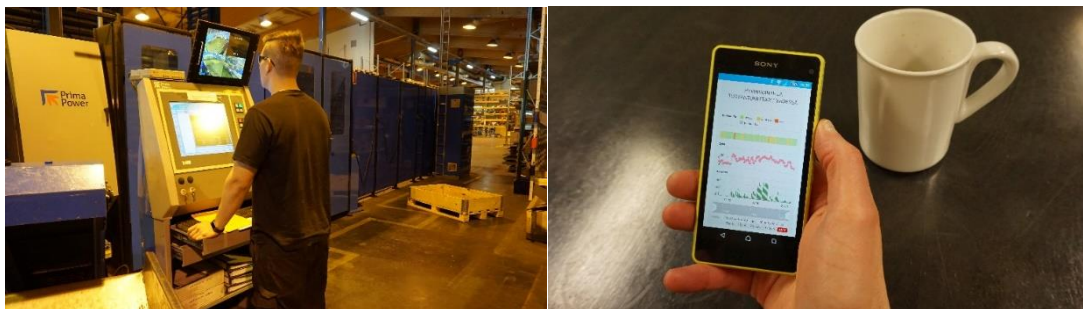
enhance the assembly of electric vehicle prototypes. During complex operations like the assembly of the safety critical brake pedal and the rear light, the worker will be assisted with augmented reality for on-the-job-guidance. . Live and video demonstrations of the AIRBUS, RWTH and IK4-TEKNIKER use cases were shown during the mid-term project review meeting which took place in Brussels, on 15 May 2018.

Furthermore, the A4BLUE AR approach will be showcased during [the 2018 Aerospace Systems and Technology Conference](#) which will take place in London, UK, on 6-8 November 2018. Airbus and CESA will present an application case using Augmented Reality, implemented by ILLOGIC during the Digital Design and Manufacturing (“Industry 4.0”) session. For further information about A4BLUE, please visit the [project website](#).

Factory2Fit Updates and upcoming events



[Factory2Fit](#) has developed a range of promising solutions to engage and empower factory workers. The last project year is devoted to piloting and a lot of interesting results are expected. Integration of the Factory2Fit solutions to pilot environments has begun and plans will be finalised in September 2018. The first Factory2Fit pilot, where factory operators were using the Worker Feedback Dashboard for 8 weeks, was successfully finalised and the other pilots will begin in Autumn 2018. Read the press release with further information here: <http://factory2fit.eu/news-updates/how-was-your-day-at-work-today/>



Parallel to piloting activities, the Factory2Fit solutions will also be presented to different stakeholders at various dissemination, networking, knowledge sharing and impact assessment activities. Close collaboration with Factory2Fit’s External Advisory Board of experts will continue during the project’s final year. There are a range of information materials available to download on the Factory2Fit website: http://factory2fit.eu/deliverables_and_downloads/

Over the coming months, Factory2Fit will be presented by project partners VTT Technical Research Centre of Finland and Chemnitz University of Technology (TUC) at the following events:

- TUC presenting at the 20th International Conference on Human-Computer Interaction (HCI 2018), 15-20 July 2018, Las Vegas, USA: 'Information at hand – Using wearable devices to display task information in the context of Industry 4.0'
- TUC presenting a poster at the 9th International Conference on Applied Human Factors and Ergonomics (AHFE), 22-26 July 2018, Orlando, USA: 'The influence of level of automation, adaptive automation and practice on performance and well-being'
- VTT presenting at Human-Work Interaction Design 2018 (HWID'18), 20-21 August 2018, Espoo, Finland: 'A Worker-centric Design and Evaluation Framework for Operator 4.0 Solutions that Support Work Well-being'
- TUC presenting at the Italian Society of Ergonomics (IEA) Congress, 26-30 August 2018, Florence, Italy: 'How to Assess Mental Workload Quick and Easy at Work: A Method Comparison'
- TUC presenting at the 51st Congress of the German Psychological Society (DGPs), 15-20 September 2018, Frankfurt, Germany: 'The influence of adapting to preferences, level of automation and practice on performance and satisfaction'
- VTT presenting at the 1st International Conference on Human Systems Engineering and Design (IHSED 2018), 25-27 October 2018, Reims, France: 'User evaluation of Industry 4.0 concepts for worker engagement'
- VTT presenting at NordiCHI 2018, 1-3 October, Oslo, Norway: 'Quantified Factory Worker: Designing a Worker Feedback Dashboard'

INCLUSIVE has contributed to the workshop "Industrial Commons as a tool to drive innovation in Europe"



The aim of the workshop, organised by the European Commission DG R&I, was to discuss the impact that ideas and technological developments in R&I projects may have on industry at large.

There are many views and opinions on the terminology "Industrial Commons". Similar to the traditional "commons" concept, e.g. land, water and air, considered as goods used in common, the EC takes "industrial commons" to mean R&D-derived knowledge, engineering and manufacturing supported with public funding as a tool to grow innovation. There is no doubt that research and innovation (R&I) collaboration between skilled people, businesses and research institutions may lead to significant knowledge spillovers, conducive to innovation.



European research and innovation projects can be considered as open innovation networks. These networks have the potential to boost the innovative capacity of the involved players. Undeniably, R&I projects are potential cradles of innovation. Near the end of a project, collaboration has reached a mature stage and the involved players are keen to see the next steps unfolding. The intentions may be to bring earmarked products to the market, and/or to create a start-up, and/or to develop a new business model. However, there is a lack of financial follow-up support by the time an R&I collaboration ends. In such a context, the "industrial commons" concept may prove an effective and sustainable tool for innovation, powerful enough to bring about complete new industries. To learn more about INCLUSIVE project, please visit: <http://www.inclusive-project.eu/>

Over the coming months, INCLUSIVE will be presented by project partners University of Modena and Reggio Emilia (UNIMORE), Aachen University (RWTH) and Technical University of Munich (TUM) at the following conferences:

- TUM, RWTH, UNIMORE presenting at the 18th International Conference on Human-Computer Interaction (HCI), 15-20 July 2018, Las Vegas, USA: "An Adaptive Speech Interface for Assistance in Maintenance and Changeover Procedures"
- UNIMORE, RWTH, TUM presenting at the 14th IEEE International Conference on Automation Science and Engineering (CASE 2018), 20-24 August 2018, Munich, Germany: 'Methodological Approach for the Evaluation of an Adaptive and Assistive Human-Machine System'
- UNIMORE presenting at the 27th IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN), 27-31 August 2018, NanJing, China: "A Framework for Affect-Based Natural Human-Robot Interaction"
- - UNIMORE presenting at the 27th IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN), 27-31 August 2018, NanJing, China: "Use of Virtual Reality for the Evaluation of Human-Robot Interaction Systems in Complex Scenarios".

HuMan Manufacturing Updates and upcoming events

After a successful review meeting held in Pontedera, Italy, [HuMan](#) technical partners continue working very hard developing the core services that are to be validated by the end users. For the next 15 months left to conclude, HuMan use cases will start the validation process following the methodology devised within the project. All services will be customized, instantiated, and deployed at shopfloor, as well as their integration within the HuMan core infrastructure. HuMan is creating a human centered workplace to support the workers' capabilities in order to increase the competitiveness of the manufacturing companies through the creation of an optimal environment for human automation, integration and cooperation.



During the last project meeting organized at our coordinator's Oslo premises, the work plan till the end of the project was traced. Technical partners presented the latest advances of the services to be deployed and validated at the three use cases: Spanish bathroom furniture manufacturing company, Royo, the aerospace giant Airbus, and the Italian robotics manufacturer Comau. Among the core services of HuMan, our AR service Knowledge In Time, will offer a cognitive support to the worker by giving detailed instructions on how to perform specific activities. This intervention is triggered when the operator manifests cognitive stress. The Exoskeleton service instead intervenes with a physical adaptation to support the operator when they experienced physical stress or tiredness. It will increase the wellbeing of the worker when doing specific efforts and preventing and avoiding possible injuries. The virtual modelling of the factory carried out by the Workplace Optimization Service, WOS, aims to monitor the production performance at the shop floor according to values retrieved from a virtual representation of the plant based on the real production environment. Two more services complement the HuMan offer, the Shopfloor Insight Intelligence, which supports long term decision making, finding bottlenecks during the tasks, and the Social Knowledge Network which captures tacit knowledge, and shares it to others in a social media fashion.



A very important part of the HuMan plan for the next months is the training materials that will be created to introduce the basic concepts of HUMAN and associated principles and goals to the workers. These will be introduced by different workshops to be held at AIRBUS, COMAU and ROYO. The main goal is to transfer the knowledge of how to use (and maintain) the services of the HUMAN system from the owners to the respective end users.

Lastly, HuMan wants to keep very active in dissemination events. To cite a few close in time, the Gizelis Open Days which took place in Athens, 30th of June to 2nd of July. LMS presented there introducing the HuMan concept to industries and sectorial industrial associations. On July 18, the [Kilometro Rosso](#) took place in Bergamo, Italy, with a similar purpose of introducing HuMan to industries. Our partners COMAU, IUVO, LMS, Holonix, SUPSI and SSSA represented us. By the end of the summer, Habitat Fair Valencia will take place (18th – 21st September) with AIDIMME leading the effort, and Habitat Congress organized by ROYO and AIDIMME on October 18th. Other possible events are envisioned for 2019 such as ICE, Technoport, Hannover Messe, etc.

MANUWORK Updates and upcoming events



Leaving behind the phase of defining Industrial requirements and system specifications, reaches the stage where the developments start to take shape. During the first nine months of the project, a series of workshops and meetings in the industrial sites took place in order to identify, and analyze current processes and procedures adopted by the project end users (Volvo Cars, Safran and Lantegi Batuak). Following the initial design phase, which involved strong collaboration between the end-users and the technology providers, the first features of the developed solutions are materialized. In order to maintain a high level of quality in the proposed solutions, the developments are tested in collaboration with industrial experts from the industry, providing meaningful insights on how to improve functionality and user friendliness. The automotive focuses on the assembly of optimal manual/automation consideration of the real-extracted from shop-floor. (Safran) focuses on the final engines and the focus will be sharing, workers' training disabilities (Lantegi Batuak) use case (Volvo Cars) car engines targeting at load balancing with time status and knowledge The aerospace use case assembly of civil aircraft on feedback/ information and satisfaction. The pilot case will use the human-machine symbiosis paradigm for supporting people with different disabilities to perform complex assembly tasks.



Over the past few months, MANUWORK consortium has actively participated in a number of events. Indicatively:

- On 6 February 2018, LMS presented MANUWORK project in EFFRA Connected Factories workshop.
- On 13 March 2018, TEKNIKER presented MANUWORK project in Industrial Robotics workshop in Tampere.
- On 27-29 April 2018, LMS presented MANUWORK in PatrasIQ Technology Transfer Exhibition, discussing with participating stakeholders on the current developments
- On 8 June 2018, VICOMTECH presented "Unlocking Augmented Interactions in Short-lived Assembly Tasks" in SOCO2018 Conference, investigating the creation of AR workspaces focused on effective interaction and visualization modes to support hybrid human-machine assembly tasks.



In September 2018, the consortium will meet to discuss on the updates and initiate meaningful discussion that will allow the self-evaluation of the progress.

WANT TO KNOW MORE?

For further information about the ACE Factories cluster and five projects, visit www.ace-factories.eu.

To **subscribe to the ACE Factories newsletter**, click here:
<http://www.ace-factories.eu/subscribe/>.



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