Impact

Welcome to the second edition of Impact, the newsletter from the European Factories of the Future Research Association (EFFRA) focusing on the work of projects launched under the EU's research and innovation programme for advanced manufacturing – 'Factories of the Future'.

In this edition EFFRA is pleased to announce that the European Commissioner for Digital Economy and Society, Günther H. Oettinger, will open our Factories of the Future 2016 Conference. The conference will feature eighty expert speakers in parallel sessions (including a unique project pitching session – The FoF Pitch.

This edition brings you news from the ROBO-PARTNER, LinkedDesign, Use-It-Wisely, Eco-Solar Factory, SYMBIO-TIC and IMPROVE projects.

The aim of this newsletter continues to be to bring news from these projects and related activities to a European audience. The newsletter is free and readers are welcome to share it with their networks.

If you have project news you wish to share you can submit it to: info@effra.eu.

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# Subscribing to Impact

*Impact* is available to anyone with an interest in factories of the future and is registered on the EFFRA Innovation Portal.

If you have colleagues/contacts who are interested in receiving this newsletter direct them to the EFFRA Innovation Portal and they will receive our next edition direct into their mailbox.

Access to the EFFRA Innovation Portal and subscription to this newsletter is free.

Innovation Portal

# Commissioner Oettinger to Open Factories of the Future Conference 2016 - New Speakers Announced

EFFRA is pleased to announce that Günther H. Oettinger, European Commissioner for Digital Economy & Society, will open our Factories of the Future Conference 2016: Materialising Factories 4.0.

As Commissioner for Digital Economy and Society, Mr. Oettinger has been a strong advocate for digitisation in manufacturing and leads the Commission's DG CNECT which co-supports the 'Factories of the Future' partnership with DG Research and Innovation.

In addition, senior representatives of four of Europe's major industrial companies will address the Factories of the Future Conference 2016 plenary:

- Andy Anderson, Chief Operating Officer, Corporate Technology Office - Airbus
- Heinz Neubert, Vice President, Corporate Technology - Siemens
- Urban Wass, Senior Vice President, Innovation & Research Policy - Volvo Group
- Peter Post, Chairman & Head of Research - FESTO

These speakers join the 80 already confirmed expert speakers who will present during the conference parallel sessions as we discuss the future of manufacturing and the achievements of the 'Factories of the Future' partnership. Further speakers will be confirmed very soon.

Our conference offers members and non-members the opportunity to debate key issues, share perspectives, learn about the achievements of projects and of course to network. It will be EFFRA's largest event to date.

Members are encouraged to inform their networks about the conference as seats are still available. A free flyer is available to download.

Factories of the Future Conference 2016: Materialising Factories 4.0 is a public event open to members and non-members. Participation by EFFRA members is free.

Register | Speakers

# Registration Open for Information Day on Factories of the Future cPPP

Registration for this year's 'Factories of the Future' partnership info day (otherwise known as the PPP Info Day) has opened.

This key call topic information and brokerage event will take place at the Charlemagne Building in Brussels on 14 October.

Online brokerage is available on the EFFRA Innovation Portal. Info Day participants who wish to briefly present their potential project idea will be required to upload their slides onto the Portal in advance. EFFRA will issue more information on this in September.

The 2017 'Factories of the Future' call topics are:

- FoF-06-2017: New product functionalities through advanced surface manufacturing processes for mass production
- FoF-07-2017: Integration of unconventional technologies for multi-material processing into manufacturing systems
- FoF-08-2017: In-line measurement and control for micro-/nano-enabled high-volume manufacturing for enhanced reliability
- FoF-09-2017: Novel design and predictive maintenance technologies for increased operating life of production systems
- FoF-10-2017: New technologies and life cycle management for reconfigurable and reusable customised products
- FoF-12-2017: ICT Innovation for Manufacturing SMEs (I4MS)

This PPP Info Day is a public event and registration is free. Participants must register via the link below and should contact the European Commission which is solely responsible for registrations.

Register | Practical Information | Factories of the Future Call 2017

# ROBO-PARTNER Project Implements Pilots

Factories of the Future project Robo-Partner has released two videos demonstrating its first results.

The first video demonstrates how human-robot cooperation works safely in a real industrial environment, making use of the latest technologies including smart watches and augmented reality. The featured demo concerns rear wheel group assembly in the automotive sector.

Watch Video

In its second video Robo-Partner demonstrates the use of human-operator support tools in the context of refrigerator assembly within the white goods industry.

Watch Video

Robo-Partner is concerned with seamless human-robot cooperation for intelligent, flexible and safe operations in the assembly factories of the future. Launched in 2013, the project has a total budget of € 8.62 million and involves fourteen partners from eight countries.

Robo-Partner | @RoboPartner | Contact

# 'Taking the LEAP' – New Book Published by LinkedDesign Project

Results from the completed Factories of the Future project LinkedDesign have been published in new book: "Taking the LEAP".

LEAP is the linked engineering and manufacturing platform developed and demonstrated by the LinkedDesign project. LEAP enables data federation, context-driven access and analysis of federated information, user collaboration and data feedback into existing systems.

"Taking the LEAP" discusses how to use the linked engineering and manufacturing platform (LEAP) to organise all product lifecycle information needed to drive engineering and manufacturing processes–from overcoming interoperability and standards problems to using the latest ICT technology in manufacturing for improved collaboration, efficiency, flexibility, and productivity

The book is available to purchase online via Amazon and Elsevier.

# Use-It-Wisely Final Event: "Remanufacturing for a Sustainable & Competitive Future"

On Tuesday the 18th of October 2016, Use-It-Wisely will hold a final dissemination event in Brussels to present the project's results, innovations and breakthroughs to key influencers and decisions makers across policy, industry and research. Industry experts will present innovations in remanufacturing, circular economy and collaboration technologies during the half-day event. The presentations will be interactive to promote open discussions on the implications of the project results on the future of remanufacturing in Europe.

- Event Details: From 09.00 on 13.00 on Tuesday 18 October 2016.
- Location: Neth-ER, 22 Rue d'Arlon, 1050 Bruxelles

Use-It-Wisely is an EU-funded research and innovation project under the Factories of the Future Public Private Partnership. The research aims to enable European manufacturers to produce products and services capable of adapting to rapidly changing markets, the changing business environment, and customer goals. The project's results will demonstrate a state-of-the-art business model and platform, which will enable life-long adaptation of high investment products and services.

As limited places are available for this event, those interested in attending are advised to book at their earliest convenience. RSVP to rachel@carrcommunications.ie.

Event Updates | @UIWFP7

# Eco-Solar Factory: Even Greener Solar Power on the Way

Europe wants to reduce its needs for raw materials and raise the level of recycling of resources in all industries, including the solar power industry.

The solar industry is one of the fastest growing economic sectors, as it provides reliable, secure and sustainable energy. However, production of PV-modules consumes considerable energy and natural resources. Besides, as long as recycling is hardly considered during module production, it will remain cumbersome and inefficient for end of life modules. If this project is successful, greenhouse gas emissions from solar panel manufacturing will decrease by 25 to 30 per cent.

Our aim is that the solar cell industry should re-use materials and components that would otherwise end up on waste sites once end of life solar cell panels are disposed of. We also want to make it possible to produce solar cell panels using less raw materials than we currently do.

To realise this, Eco-Solar will develop an integrated value chain to manufacture and implement solar panels in the most ecologic way, taking into account reuse of materials while manufacturing and repurposing solar panel components at end of life stage. Moreover, the project will demonstrate defaulting panels to be identified and diagnosed for repair or replacement.

*SINTEF Research Scientist Martin Bellmann shows solar cell materials that would otherwise end up on waste sites. Photo: SINTEF / Thor Nielsen*

## *Cheaper and Greener Panels Through Recycling*

Reusing materials and reducing the consumption of raw materials will make solar cell panels both cheaper and greener. When less new materials and components are

needed, the emissions of greenhouse gases from their production will decrease. Likewise, the energy consumed by these processes will be paid off faster than it is today.

Therefore, Eco-Solar aims to recycle resources used in solar-panel production that are currently treated as waste, such as:

- argon gas, used in furnaces in silicon wafer production
- crucibles, used to smelt silicon
- silicon dust, created when wafers used in solar cells are sawn up
- pure water from solar cell production.

Moreover, current state-of-the-art solar modules are difficult to recycle. The project will develop modules that are free of lamination and soldering as part of the state of the art encapsulation techniques. This reduces costs of materials, but also allows modules to be disassembled easily without damaging their individual components, thus enabling glass, solar cells, copper tabs for electrical interconnection, etc. to be recovered for reuse or recycling.

*Smaller Carbon Footprint by Reducing Consumption of Raw Materials*

The aim is to reduce the consumption of raw materials by which the carbon footprint will shrink by 25 - 30 per cent for panels using the more common type of solar cells, which are known as multicrystalline silicon cells. Eco-Solar aims to reduce the consumption of resources by:

- modifying cell design so that the use of silver in electrical contacts can be reduced
- developing frameless panels that do not require aluminium
- developing glass/glass modules without EVA (ethylene vinyl acetate) or other organic materials for encapsulation nor organic rear sheets like PVF (polyvinyl fluoride).

*Solar-Cell "Doctor" on the Way*

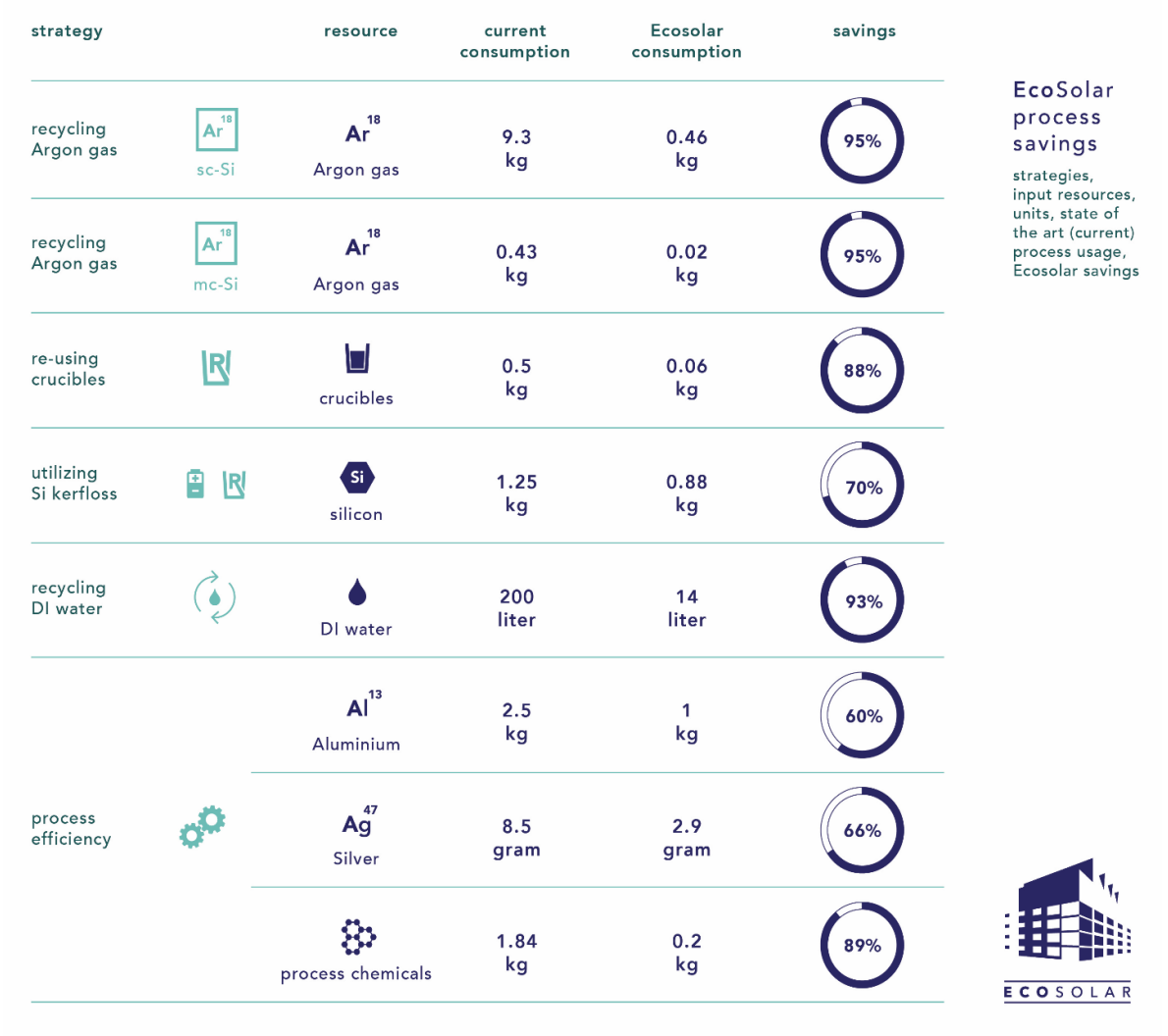
A further aim of the project is to develop a solar-cell "doctor": a fully automated system capable of identifying defects in finished cells and repairing those that are capable of being rescued. This is intended to ensure the best possible performance of panels once they have been installed on the premises of clients.

*Strengthening the European PV market*

The overarching aim is to strengthen European companies who are driven by innovation and who are able to secure Europe's power supply in a sustainable way. Companies will benefit from:

- cost reductions while reducing materials consumption and enabling recycling,
- novel applications for materials that would otherwise been discarded as industrial waste.
- improving power production from solar panel installations, by incorporating sensors that will give a warning signal when a panel is damaged, so that it can be replaced promptly.

It is envisioned that the results of the project will be on the market within year two of the completion of the project.




*Impact: reducing carbon footprint of solar energy panels*

Eco-Solar is a three-year project with a budget of €5.64 million, which is financed by the European Union's Horizon 2020 research and innovation programme under grant agreement No 679692.

Eco-Solar Project | Contact

# SYMBIO-TIC Project – Bridging the Gap Between Humans & Robots for Collaboration in Factories

It is a fact that collaborative robots have become an increasing trendsetter during recent times. However, safety and adaptation to tasks and changes are still handicaps for cost-effective integration and use of robots for assembly tasks in fenceless factories. For this reason, SYMBIO-TIC as a EU funded project inside the Horizon 2020 framework seeks to create an ecosystem of exploitable technologies which will be validated through three technological demonstrators in real factories and presented to the public in at least one international fair presumably during year 2018.

SYMBIO-TIC, which started in mid-2015 under the coordination of Royal Institute of Technology (KTH), presents after the first year of development a fast and successful progress towards smart factories. The project ideas are illustrated in the diagram at the end of the article.

Collaboration is the most important requirement to be satisfied in this project, in this case through the possibility to track workers during their routines with a combination of safe and non-safe vision systems to allow the coexistence of humans and traditional industrial robots. Active collision avoidance is maintained for collaborative tasks via real-time supervised robot controlling. Trajectories are calculated with focus on minimizing energy consumption by keeping the safest and most efficient path.

From line workers' perspective, tasks are automatically scheduled to accomplish production goals according to the robot and human elements currently on the scene. For example, the system assigns tasks to the available humans or robots depending on their availability and proficiency level. Therefore, current assembly plan is modified when a worker needs to leave his place.

Workers are also able to interact with the system visually and aurally through different channels such as speech recognition, monitors, gloves, QR identification, motion identification, augmented reality glasses or simple screens. Human-friendly instructions as part of a suitable assembly sequence are generated for collaborative tasks depending on key indicators of the employees' competence level.

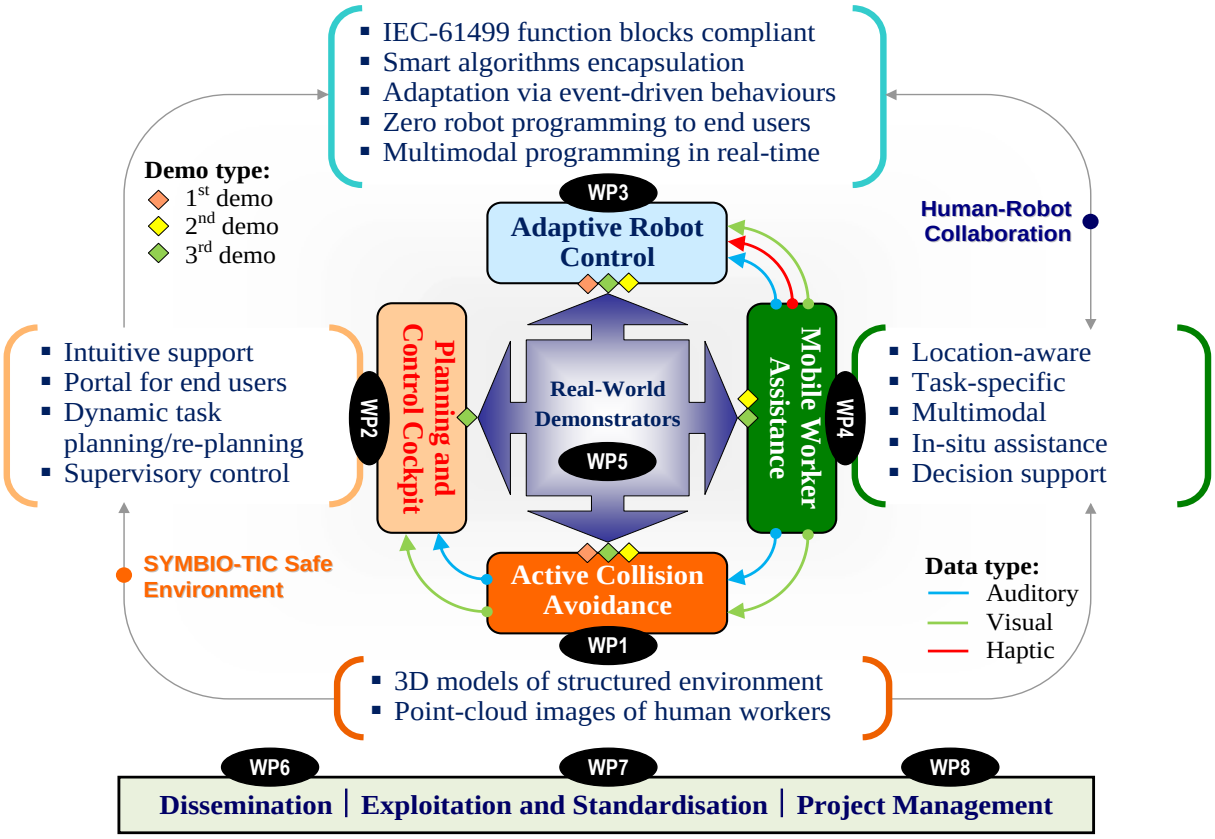
From the integrator perspective, just a little effort is required to set up and run the SYMBIO-TIC system thanks to the compatibility with legacy hardware. A basic set of simple function blocks needs to be defined only once. Then they can be transparently combined into high-level blocks through an intuitive programming application called *drag&bot* and a modular system architecture. The industrial standard IEC 61499 integrated as low-level executor (https://eclipse.org/4diac/) environment guarantees robustness and reliability.

The initial results of these technologies have already led to the definition of three real industrial demonstrators in Germany, Spain and Sweden by respectively increasing grade of difficulty and SYMBIO-TIC subsystems integration.

The first one is a food repacking application carried out in Germany by company Robomotion under Fraunhofer IPA support. Daily production outcome is vital to the success of the technological demonstrator. Therefore, robots must move at full speed if no human is near and avoid them, but reduce speed or even stop, if humans are at risk.

The second demonstrator presents an aeronautical parts drilling operation at Aciturri supported by Ideko and Prodintec in Spain. In this case, the flexibility to adapt the process to different positions, tools and geometries together with safety are the focus of the application.

The third demonstrator is supported by the University of Skövde in Sweden and takes place at Volvo Cars Engine. It puts together all developments from SYMBIO-TIC in a collaborative and portable assembly assistant.



The goal of SYMBIO-TIC where the biggest potential industrial impact resides, consists of turning traditional industrial robot arms into safe, flexible and intelligent systems at low cost. Legacy robotic cells will be easily upgradable to environment adaptive collaborative systems by having the possibility of adding SYMBIO-TIC as external component to an existing system. Also, a side effect of the good progress of the project is a foreseeable spin-offs founding and patenting related to some of the technologies used or developed in SYMBIO-TIC, such as function block-based programming and flexible assembly processes.

SYMBIO-TIC | Contact

# IMPROVE – Enhancing Competitiveness for European Manufacturers

The overall mission of the multinational research project IMPROVE is to create a virtual Factory of the Future improving industrial production processes. It is based on a smart data approach which will simplify the daily workflows of employees in manufacturing companies throughout Europe. The solution aims to help shifting tasks like anomaly detection or optimization from human cognitive resources to decision support systems and thus reduce the growing complexity of production plants.

IMPROVE (Innovative Modelling Approaches for Production Systems) was launched in 2015 with funding from the European Union's Horizon 2020 research and innovation programme.

In order to enable European Enterprises and SMEs to face the current production challenges and utilize new technologies, IMPROVE is developing user support functions with a main focus on self-diagnosis and self-optimization. These functions, such as condition monitoring or energy and output optimization, are normally based on cognitive capabilities solved by human experts.

The human expertise or additional engineering steps needed to deal with increasingly complex production workflows will be replaced by a tool which automatically analyses data and derives algorithms and models describing the system behaviour in complex, large and distributed production plants. This approach applies ideas from big data combining real-time data from the physical world with information in the so-called virtual Factory of the Future (vFoF).

The optimization procedure goes through different steps. At first, the factory life-cycle of the physical Factory of the Future (pFoF) is optimized. The pFoF is improved using the virtual FoF as a simulated experiment environment. The virtual FoF serves for monitoring purposes such as unplanned production stops in complex supply chains. Finally, a Human Machine Interface (HMI) supports the production staff in handling

new functions on complex machines. This new data-driven approach will pave the way to the next generation of manufacturing and Industry 4.0.

As the project is strongly focused on its practical applicability and its benefits for SMEs, the consortium targets a high technology readiness level (TRL). Multiple demonstrators serve as platforms to verify the project results and make them accessible for industrial partners.

The project partners make use of their access to powerful laboratory demonstrators and real life production plants. The technologies for data acquisition, model learning, simulation, optimization and the decision support system are developed, tested and verified in real conditions. The use cases of the demonstrators include a composite line for shaping fluid plastics filaments, compact lines for packaging and a production line for stretching plastic films.

*Use Case 1: Packing Film Line of Brückner*

The application areas for the plastic film produced by Brückner reach from food packaging to high tech film for battery membranes. As so far most quality parameters can only be measured later in the laboratory, a big amount of bad quality film is being produced before quality issues can be detected. An automatic diagnosis system based on a data infrastructure can help by automatically informing the operator in time about upcoming quality issues. Current machine settings are collected with their timestamps and integrated in a mathematic model of the plastic stretching line which then calculates a prediction of quality parameters.

*Use Case 2: Compact Lines of OCME*

Traditional packing machines are built for explicit product types. A change in the product range typically requires high engineering efforts and costs. To ensure more flexibility and adapt to the increasingly short product lifecycles, the performance of modular (“compact”) lines becomes more important. Challenges that have to be

tackled here include the buffer between the single modules which have to interact in a synchronised way or possible failures of individual modules which make the whole line stop. It is expected that the IMPROVE results will lead to a 20 percent increase of in the mean time between failures on the one hand and the line efficiency on the other. A seamless simulation and model which is based on the actual plant data will lead to reducing the design effort by another 20 percent.

*Use Case 3: The Composite Lines of Reicofil*

The pressurized cabin used for certain plastic extrusion lines may block for several reasons. Any anomaly interrupts the production and employees have to clean the cabin and install new air rectifiers – a costly procedure with a downtime of at least 72 hours and an extensive production loss. Based on the learned models of the normal cabin behaviour developed in IMPROVE, the blockage can be predicted in advance which keeps the air rectifiers from getting damaged and reduces the downtime to 2 hours only.

All technologies developed in IMPROVE are thus tested and verified in real life scenarios making use of actual companies' production data. The project avoids working with small demonstrators which are unable to reproduce the amounts of data a real production can create.

IMPROVE | Contact

## Contact

If you have suggestions, questions or comments concerning this newsletter, contact info@effra.eu.

## Disclaimer



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