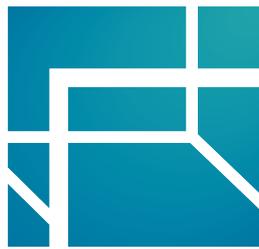


# I4MS

|                  |   |
|------------------|---|
| Title:           | A Reconfigurable robot workCell for fast set-up of automated assembly processes in SMEs |
| Acronym:         | <b>ReconCell</b>  |
| Type of Action:  | Innovation Action   |
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## 1. Executive Summary

D 7.3 “Developer, Distribution & Manufacturing Network as well as new I4MS knowledge hubs establishments and operations” reports about the outreach towards potential stakeholders and the mentoring of five Digital Innovation Hubs (DIH) in collaboration with I4MS. The deliverable introduces the networks and their role for the project, and then reports about the status of the networks and future plans. Finally, the deliverable will give a status on the DIH establishment and future collaboration plans.

## 2. Introduction

The following deliverable is connected to T7.1 - T7.3 that focus on involving potential stakeholders like developers, end-users or distribution partners and engaging them into dialogue to get feedback for the development and commercialization of the ReconCell. The networks in ReconCell should not be confused with T7.5 Public Awareness. Even though they increase the outreach of the project, these networks rather focus on actively involving a core group of stakeholders that can contribute to the progress of the project. In the following, we give an idea of how we envision the ReconCell networks, what their role is in the project and how the results from the networks contribute to the project's success. This outline is a result of a literature analysis in combination with results collected from interactions with stakeholders during exhibitions, conferences, workshops and post-campaign conversations.

### **T 7.1 Establish the ReconCell Developer Network**

To support the continued development of a diverse set of skills and tools for the Webshop, it is essential to motivate system integrators, technology companies, students and others with an entrepreneurial interest and technological capability to join the ReconCell Developer Network. This enables ReconCell to meet a wide range of future needs from manufacturing companies for their specific needs.

### **T7.2 Establish the ReconCell Distribution Network**

To get ReconCell into the market, a significant number of Distribution Partners must be contacted and motivated to work on the marketing, sales, installation, end-user training, support and maintenance. In the project period, a number of such candidates will be contacted and engaged in dialogue about such collaborations.

### **T7.3 Establish the ReconCell Early-Adopter Manufacturing Network and Coaching Activities**

To get feedback from manufacturing companies and learn more about their assembly manufacturing, a network of early-adopters must be established. Within this network, we are also going to disseminate information about the ReconCell technologies for SMEs. Our goal is to raise awareness about the possibilities of automated robot assembly in SMEs.

## 2.1 ReconCell networks and their envisioned role

In literature on network formation, a recurring trait in the description of how networks are formed is the fact that the foundation of the network is the exchange of resources and that there is a degree of resource interdependence. By definition, participation in a network is voluntary and therefore rests on the participants seeing advantages for themselves in participating (Freeman, 1991; Peltoniemi, 2004). Furthermore, networks are also characterised by the degree of commitment, or rather by how closely integrated the actors are. Networks of high integration are often referred to as “communities”, with many common and specific projects of cooperation. More loosely integrated networks are sometimes referred to as “issues networks”, and are characterised by the actors being united on one or a few specific issues; once the issue in question has been settled, the functionality of the network may come to an end as well (Frooman, J., 2010). In "community" networks, working on specific issues may over time lead to the formation of a value-based unity on the achievement of the overall general goals, in which the cohesion is strong enough to reconcile potential conflicts of interest between the actors.

Obviously, a network is created with a certain activity in the centre, and there must be a central element for the formation of the network.

The establishment of a network can be the result of a lucky coincidence of changing conditions and favourable circumstances, or the result of some pre-conceived master plan. The networks in ReconCell were created according to a pre-defined plan and could rather be defined as loose “issue networks” that deal with a specific topic during the course of the project. Nevertheless, they change their focus through the course of the workcell development and commercialization process. This first network period had two main topics:

- bringing together developers who can give feedback on the use cases of ReconCell and, in future topics, contribute to the creation of simulation of the workcell
- reaching out to manufacturing SMEs (end-users) and potential distribution partners to get initial feedback on the workcell design and gain their interest for future topics focusing on commercialization

The first topic was mainly tackled during the Developer Days organized by MMI, the second topic was mainly discussed at exhibitions, where these stakeholders could see the actual workcell and directly talk with developers about the design. Some fruitful discussions took place in post-campaign phone conversations.

Future topics in the coming networking phase until the end of the project will be the dissemination of information about the ReconCell technologies to actors in the value chain. The goal is to raise awareness about the possibilities of automated robot assembly in SMEs and specially to get tangible feedback on the business case parameters to proceed with the commercialization of the workcell.

The participants in a network can come from a broad cross-section of disciplines, and from the national, as well as the regional level, e.g. ministerial representation, CVT committees, employment office, Trade Unions, Shop Stewards, vocational colleges, Universities, Enterprises, Municipalities, regional authority etc. Each participant can have either a primary or a secondary relation to the network. During this first network phase of ReconCell, it appeared easier to involve Universities and representatives from robotics industry as it was exactly their topic of interest and they were able to evaluate the potential very well. In addition, manufacturing companies could give useful input on the workcell design and valuable feedback for the business case calculations. However, until the workcell design is finished and they are able to get detailed information on the main product (cell specifications, price, release date, etc.) it is a challenge for them to give detailed evaluations.

Self-interest is the fundamental element in the integrational power of a network and due to the very existence of a network and the results achieved by it, a network can grow to become a strong “communities” network. According to Mariotti (2002), a value network is “an interactive combination of information machines, and people.” Value networks are concentrated in creating value in each node. Besides the self-interest of stakeholders to become innovation front-runners and to co-design a future robotics workcell according to their needs, the educational aspect also plays a great role. The development of our society is characterized by the consequences of globalization: rapid growth and rapid development of production and technology, which make great demands for competence development and learning. Machines increasingly replace repetitive tasks in production, and thus our economy has become more knowledge-based in recent years. The fact, that production becomes more knowledge-based, places new demands on companies and employees. Knowledge and the human factor will be central to the competitive situation of companies, especially concerning the implementation of

new technological and digital production methods. In other words, education in general has gained and is becoming an increasingly crucial part of society. Today, the basic competitive parameters are referred to as innovation and creativity, which means that business is constantly renewing itself. Therefore, a regular worker must increasingly possess some professional skills, but at the same time qualifications such as resilience, ingenuity and creativity. This means that the workforce must constantly be able to participate in changed job functions, which means that they must constantly be able to renew their knowledge and skills. Consequently, there will be a need for education processes to ensure that the individual has a wide qualification basis, while maintaining the possibility of professional depth. The participation in the ReconCell network allows companies to educate their employees on future products, already involve them in the development process to gain new skills and increase their qualifications.

From our initial conversations with manufacturing companies and general policy makers, it turned out that the self-interest of stakeholders could be increased by including innovation policy as the headline for a holistic approach, where labour market, education and enterprise policy is seen as a coherent whole for strengthening potential growth areas. This whole understanding is crucial for the centre of the network to get a higher interest from network members and a broader target audience and at the same time translate it into specific development initiatives for SMEs (Romero & Molina, 2011). To strengthen the network in the future, we must continuously ask the following questions: “How do we coordinate the three elements of Labour market, Education and Enterprise Policy better? And what is necessary each participant in the network does?”.

It is crucial that the core of the network is considered as a competent unit, that understands the conditions for an SME to change their production methods, in order for SMEs to have engagement and interest in the network. The Enhancer tool will represent the competent unit that includes knowledge collected from all ReconCell partners and collects information on SMEs needs, as well as constantly giving SMEs feedback and knowledge on changes and possibilities of their production methods with the ReconCell workcell.

### 3. Results of first networking phase and future plans

In this first phase, the developer network was started during the Developer Days (see D.7.2) where 20 organizations (40 participants) participated and the ReconCell VEROSIM Software Development Kit was released. The aim was to bring together potential users and developers of VEROSIM in industry and research and to discuss the use cases and get high-value feedback from attendees on the Developer Kit. Developers were motivated to join the network via selected e-mail campaigns to sufficient leads, the ReconCell workshop at the euRobotics Forum 2016 and existing connections of the ReconCell partners. The network was strengthened through exhibition participation such as Hannover Fair and Automatica after the Developer Days. In the future, the network will be specifically used to define the tasks of the webshop once the ReconCell products are specified. Furthermore, suitable members of the network will be targeted and asked to give input and feedback on the role of simulation in the solution selling and business modeling processes.

The approach for starting up the distribution and end-user manufacturing network was direct e-mail marketing to a large number of stakeholders including introductory digital material as well as exhibitions. As a first conclusion, exhibitions were more efficient and stakeholders were much more interested to engage in dialogue than when receiving e-mail campaigns. A successful methodology turned out to be the combination of a campaign after an exhibition event. The methodology helped to stay in contact with a few selected stakeholders that had enough expertise to contribute and were also willing to invest their time.

All in all, we have received 140 contact details from interested exhibition and fair participants, mainly manufacturing companies. A follow-up campaign was sent out to all of them about ReconCell and Flex Hex. We are still in contact with around 15%, and see potential for increasing collaboration once more specific information on the actual workcell as a product is available. ReconCell partners have also presented the project at scientific conferences and journals (updated publication list available on [www.ReconCell.eu](http://www.ReconCell.eu)) but also on industry days and Digital Innovation Hub events. Especially industry events achieved a good outreach and we received attention from companies to join the network and participate in the open call from events such as

- A journey into European factories of the future, Graz, Austria, December 1<sup>st</sup>, 2016
- Days of best practice: introduction of collaboration between industry and institutes” in Ljubljana, Slovenia, September 28th-29th, 2017
- Digital Innovation Hubs: Key towards broad digital transformation of European industry, Spanish Ministry of Economy, Industry and Competitiveness (MINECO), Madrid, Spain, September 22nd, 2017
- Manufuture 2017 (<http://manufuture2017.eu>), Tallinn, Estonia, October 24-25, 2017
- Login Conference, Vilnius, Lithuania, May, 5th-6th, 2016

Besides the search for contacts at events and exhibitions, we have also collected around 650 contacts that match the desired skills/people in the network: CEO, CTO, Senior Technical Engineers, Factory Managers, Production Managers, R&D Managers within the Automation/Robotics area from European countries with large manufacturing industry. We also entered into dialogue with around 70 Danish integrators (amongst other fairs, HI Tech & Industry was a very useful event for this target audience), which are awaiting new material and discussion opportunities now.

The original campaign plan targeted to send out regular campaigns to different contacts every month to allow for adjustments along the way after each campaign. However, the campaign plan was re-defined due to a low response rate of recipients. The collected contacts and

interested members for the network are very valuable and asking them for feedback too frequently without considering their self-interest in the network would lead them to becoming unsatisfied with the network unit and its competences. Thus, the following steps, which mainly deal with the commercialization foundation, were necessary before further campaigns could be sent out:

- Describe the product roadmap in more detail in form of a minimal viable product (MVP) for the ReconCell workcell, also informing about specifications so that network members can give more detailed feedback on how they could use the product and what the business case would look like
- Finalizing the Enhancer to represent a competent unit that includes knowledge from all ReconCell partners, considers the self-interest of stakeholders and at the same time collects feedback for the commercialization of the workcell
- Discuss all material in detail with ReconCell use cases to ensure the self-interest of potential members and discover potential issues
- Finalize the business case for ReconCell use cases to create a general template that can be included as a feature in the Enhancer to estimate the commercialization potential of the MVP

The first version of the Enhancer was scheduled to be finalized in time for the ReconCell Open Call. The open call has been generally advertised on the ReconCell homepage, through I4MS, a first e-mail campaign, and in a Linked-In campaign that was shared with +1M members. There has already been interest by manufacturing SMEs, which are now awaiting the call documents and the opening of the call. At the moment, applicants are able to enter basic information into the submission system and upload their proposal and a video (see Figure 1). Towards the end of the open call, specific features e.g. to calculate the assembly potential of a product, the business case for a company, etc. will be added. The open call is a good way to catch the initial interest of potential network members and the above-mentioned features will increase their involvement. Once they are registered on the Enhancer platform, ReconCell can give more individual feedback and communication is easier than via e-mail or telephone. It will also allow for screening of the manufacturing company to review their technical knowhow and needs.

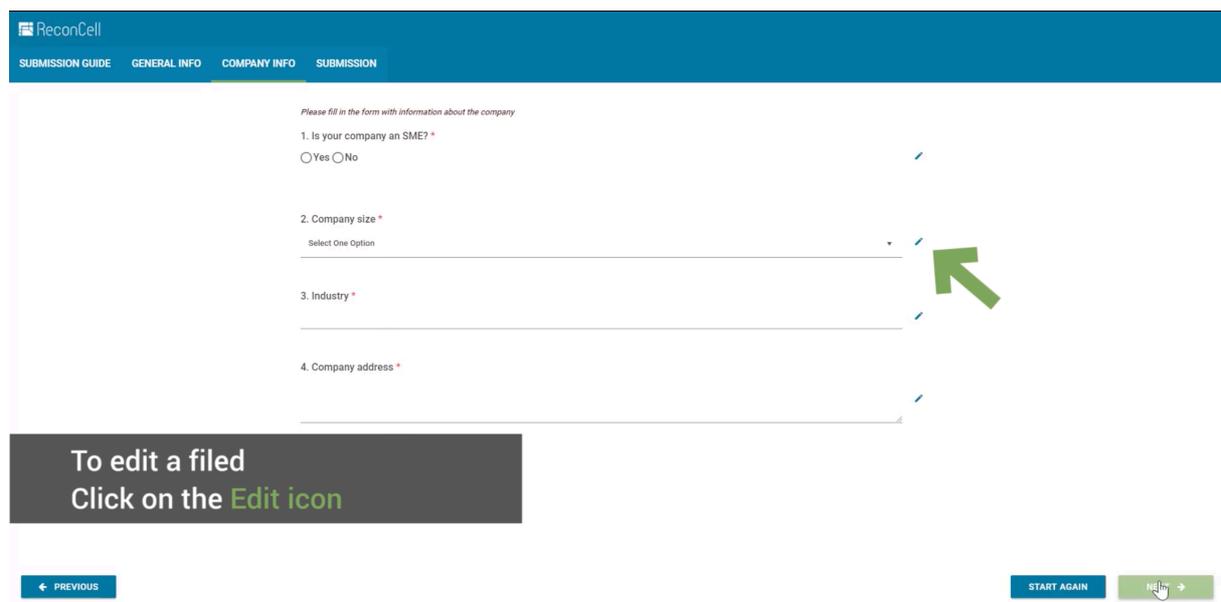


Figure 1: Screenshot from introduction video to ReconCell Open Call Submission platform

## 4. Digital Innovation Hubs

Besides establishing an end-user manufacturing network, T7.3 also included the task to provide coaching to five Digital Innovation Hubs. The first task assigned from I4MS was to assist in the evaluation and selection process. For this, A. Ude (JSI) and N. Krüger (SDU) participated in the evaluation of proposals submitted to the call for feasibility studies on Digital Innovation Hubs as part of the I4MS program. As a result of the call, the ReconCell project was assigned the task of mentoring five feasibility studies:

- Feasibility study for Serbian Manufacturing Innovation Hub (FS4SMIH)
- iAsturias 4.0 Feasibility study of a new RDMI-Hub
- RALM Feasibility study and business plan development for a new Regional Digital Innovation Hub on Robotics for Advanced Lithuanian Manufacturing Industry
- Smart IC Robotics in Estonia
- Industry Brains: For the establishment of a feasibility study

ReconCell performed the following tasks to support the innovation hubs that have been selected and are relevant to the technology offered within the project:

- Provide coaching to the five above listed digital innovation hubs about the digital technologies adopted and used in the project, as well as innovation best practices
- Provide the digital innovation hubs under its responsibility with the competences required to carry out around the feasibility studies in their respective regions
- Participate to conferences, workshops and expert meetings in the selected regions
- Provide a confirmation that the contract to third parties are fully comply with the abovementioned requirements

The tasks were executed by five partners from the ReconCell project: JSI, SDU, MMI, UGOE, BOR, who each mentored one innovation Hub. Representatives from ReconCell (A. Ude (JSI), N. Krüger (SDU) and C. Risager (BOR)) participated in summer school at MTC, Coventry, UK, September 21st – 23rd, 2016 to kick-off the mentoring and at the final mentoring event in Madrid, Spain, September 21st, 2017 (A. Ude (JSI), N. Krüger (SDU), Z. Gosar (ELVEZ)). Throughout the course of the mentoring, other representatives participated in webinars organized by I4MS. Likewise, members of the hubs participated in all events and webinars organized by I4MS.

During the mentoring process, ReconCell partners also participated in calls, e-mail discussion and provided input to sheets to give feedback on the evaluation and collect data for I4MS brochures and marketing material. All deliverables were forwarded to I4MS to create a common report and evaluation about the mentoring and DIH establishment.

In the following, we report about the mentoring of each Hub.

JSI mentored the feasibility study of **Serbian digital innovation hub FS4SMIH**, proposed by University of Belgrade, Institute Mihailo Pupin, and SERVOTEH, Belgrade. The hub was very active and by the end of the project, they prepared the following deliverables:

1. Project management report.
2. Report on Serbian ecosystem in robotics including a catalogue of stakeholders in Serbia.
3. Report on two workshops organized by the hub on December 12th, 2016, and May 24th, 2017. The workshops gathered carefully chosen participants coming from companies, educational and research institutions, ministries, innovation fund, as well as other relevant governmental and nongovernmental organizations. The appointed mentor Aleš Ude (JSI) attended the workshop on December 12th, 2016.
4. Report on three use case studies prepared by the hub:

- a. Camera based tool-centre-point calibration for robots for company Vision Equipment.
  - b. Robotized tending of a press for sintering for company Corun Holding.
  - c. Forging automation using industrial robots for company Kovački Centar.
5. Business Plan for the establishment of a digital innovation hub and its regular operation on economic basis.

Members of the hub visited the mentoring institution JSI on May 31st – June 1st, 2017, to discuss the achievements of the feasibility study. All reports were submitted by July 11th, 2017.

The **IndustryBrains** digital innovation hub located in Aalborg, Denmark was mentored by the MMI. The MMI supervised the general process of creating documents and instructed the funding in three fixed portions. This included supporting the hub with regard to requests on formalities, requirements and the participation in meetings. MMI representatives got in touch with members of the hub's steering committee, attended a meeting with a manufacturing company and by that, got a deep insight in the hub's work and plans.

IndustryBrains made great efforts to provide a thorough overview on the innovation ecosystem in northern Denmark by gathering a set of use cases and user stories of a variety of manufacturing SMEs. By analyzing the operational activities of ICT (Information and communication technology) manufacturing companies located in the Northern Denmark region, key benefits were derived to identify the impact of the digital innovation hub as matchmaker between SMEs. A service portfolio and organizational structures were established and strategies developed to classify potential members. As a result, the hub submitted a comprehensive business plan outlining its financial and strategic planning.

In general, the collaboration was successful and showed commitment to the project: According to the deliverables, all required documents were provided by the innovation hub's representatives on time.

SDU acted as mentor for the DIH **iAsturias4.0**. There have been meetings at the summer school in Coventry, in various Skype calls and at the workshop in Gijon, where N. Krueger also gave a talk on the 24th of January 2016 about ReconCell. In these meetings, the iAsturias4.0 consortium has outlined the situation in the area and has developed suitable use cases. The workshop allowed the SDU representative to get in contact with local companies. Overall, the DIH can have a positive influence on the development of the area, in case it can be stabilized as part of the local infrastructure.



Figure 2: Demonstration in the lab at UGOE

UGOE has been coaching the Estonian Hub: **SmartIC Robotics - a new robotics Digital Innovation Hub in Estonia**. The work of this hub was successful and

performed many activities. Tasks were finalized in time and deliverables were submitted without delay. The following tasks were reported on in the final report:

- Activity 1: Prof Tauno Otto (TUT) and Prof Jüri Riives have taken part of the kick-off meeting and the seminar in UK in September 2016, visiting the Summer School of I4MS.
- Activity 2. Development of the Feasibility study, including up to 3 use cases:
  - 2.1 Analysis of the regional eco-system (TUT) has been carried out by involving all relevant stakeholders:
  - 2.2 Three use-cases have been prepared by IMECC:
- Activity 3: Preparation of the business model
- Activity 4: Organisation of the work-shop.
- Activity 5: Project management

BOR mentored the Digital Innovation **Hub RALM Feasibility study and business plan development for a new Regional Digital Innovation Hub on Robotics for Advanced Lithuanian Manufacturing Industry** that is officially re-named itself during the course of the project to “Digital Innovation Hub for Robotics in Lithuania (DIHRL)”.

The Hub is coordinated by the Lithuanian Robotics Association (LRA) which was co-founded by key robotic companies in search for joint opportunities and to help develop the robotics market in Lithuania. Currently the organization is focused on dissemination, networking activities and establishing the links with major players of Lithuanian robotics ecosystem.

The Hub has currently a selection procedure to establish formal links with 4 competence centers in Lithuania, which is planned to be finished at the end of 2017. Their activities and services include training and education, network development, support of new product and start-up development, ecosystem building and networking, dissemination and awareness. Their focus on innovation is from TRL 4 - technology validated in lab; to TRL 7 - system prototype demonstration in operational environment.



Figure 3: Panel participants during DIHRL workshop in Vilnius.

BOR had mentoring Skype calls every second week with alternating between the Open Coffee Club or the coordinator LRA. The calls were arranged between the hub and the mentor to review the progress and discuss issues or questions. The originally agreed deliverables were changed according to the presented material in the webinars. The DIHRL submitted their mid-term report and received their second payment afterwards. Towards the end of this reporting period, the hub organized a successful workshop in Vilnius (May 17-18, 2017) with participants from

other hubs in Europe. BOR Co-CEO John Erland Østergaard presented and participated in a panel discussion. The final report of the Hub has been submitted on July 31<sup>st</sup>, 2017, which mainly focuses on the business plan for the Hub, which was not discussed in the previous

deliverables. The business plan was prepared according to the practices outlined in an I4MS webinar.

Besides the mentoring of the Hub, ReconCell has also contributed to the impact assessment and establishment of a European innovation map by filling in the questionnaire required to be registered as Digital Innovation Hub or Competence Center.

## 5. Conclusion

In this deliverable, we have outlined the importance of the ReconCell networks and what their role in the project is. Furthermore, an overview over the current status and future tasks for the network was given. The work performed in the networks is closely interlinked with the commercialization part, which will be reported on in the next deliverable. Finally, we have also reported on the coaching of five DIH by ReconCell over the period of September 2016 - July 2017.

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