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Engagement and Assessment of Involvements of SMEs

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Abbreviations

ARTEMIS	Advanced Research & Technology for EMbedded Intelligent Systems
CSA	Coordinating and Support Action
DAC	Digitize Analyze Control
EC	European Commission
ECS	Electronic Components and Systems
ECSEL JU	Electronic Components and Systems for European Leadership Joint Undertaking
EFFRA	European Factories of the Future Research Association
GDP	Gross Domestic Product
IMR	Irish Manufacturing Research
IPR	Intellectual Property Rights
KERs	Key Exploitable Results
KPI	Key Performance Indicators
OEM	Original Equipment Manufacturer
R&D	Research and Development
SME	Small and Medium Enterprise
TRL	Technology Readiness Level)
TRL	Technology Readiness Level
USP	Unique Selling Point
VOTF	Vehicle Of The Future

1 Introduction

This Coordination Support Action (CSA) supports and facilitates the goals of the Industry4.E Lighthouse Initiative through proactive actions **designed to promote an environment in which projects and stakeholders can more readily network, interact and cooperate**. By identifying and capitalising on complementary opportunities in strategic planning, networking and coordination between initiatives across Europe, this CSA helps Industry4.E related projects and programmes achieve their full synergistic potential. One of the tasks of the consortium is to understand and improve the experience and efficiency of the ECSEL JU programme. Especially small and medium-sized enterprises often need support with the activities performed over the course of the Industry4.E Lighthouse projects. This deliverable describes the experience of SMEs, lessons learned from these experiences and the larger vision and strategy for reaching out to and integrating SMEs in a wholesome way.

2 Engagement Methodology

The SME engagement was probed by different sets of interviews. These were carried out at different stages of the project and with varying depth. These interviews were conducted in person, over the phone and online. The goal of these interviews was to specifically find out about the SME experience as part of an Industry 4.E Lighthouse Project to gain a better understanding of the attractiveness of the ECSEL JU programme to small and medium enterprises.

There were three sets of interviews:

1. Survey of 40 SME's that attended the VOTF (Vehicle of the Future) cluster meeting in Ireland on the 28th of February 2019 hosted by IMR.
2. A dedicated SME Engagement Survey assessing the experiences of SMEs in the ECSEL JU programme aiming towards improving the attractiveness of the programme in the future.
3. The interview with [DAC.digital](#) Chief Innovation Officer Mateusz Bonecki detailing important aspects of their ECSEL experience as an exemplary SMEs having contributed to various projects already.

3 SME experience survey

An earlier survey at the VOTF (Vehicle of the Future) cluster meeting in Ireland on the 28th of February 2019 showed that the ECSEL JU programme is not well known among SMEs, even when knowing about Horizon 2020. This led to the need of better understanding the experiences SMEs had in an ECSEL project.

3.1 SME experience survey

To better understand the way of how to involve SMEs more successfully, the following interview was conducted during the EF ECS event 2019 in Helsinki and subsequently online via EU Survey¹. The questionnaire detailing six questions was filled out by a total of 9 SMEs from different Industry 4.E Lighthouse projects. All following content was suggested by answers to the questionnaire. The questions were:

1. What is special about the ECSEL projects compared to other programmes (USP)
2. Gains / good points / benefits
3. Pains / bad points
4. Solution
5. Lesson learnt
6. SME engagement

3.1.1 ECSEL Unique Selling Point

The biggest advantage of the ECSEL JU programme is the size of the consortium in the projects. It allows companies to work closely together with players of all interests and sizes within their industry.

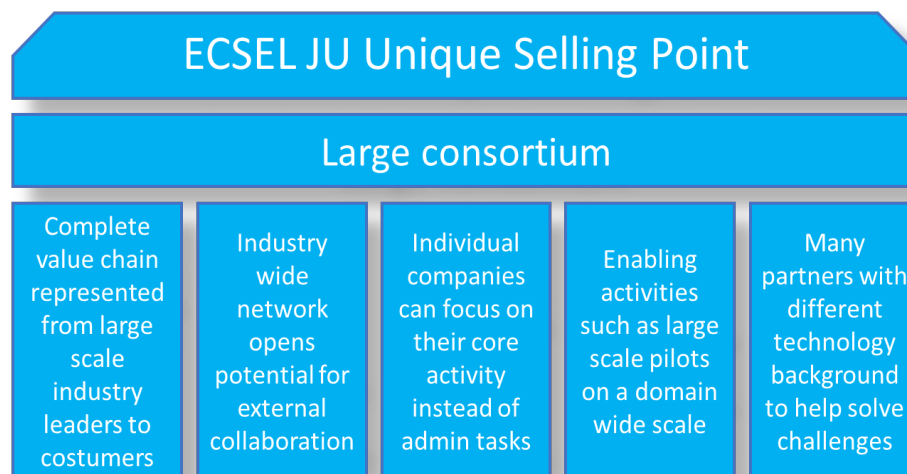


Figure 1: ECSEL JU Unique Selling Point

¹ <https://ec.europa.eu/eusurvey/runner/I4EECSELfeedback>

Every ECSEL project is an ecosystem of its own, allowing for testbeds, access to clients' feedback, insight into large companies and the general potential to jointly shape their industry.

3.1.2 Gains

The ECSEL JU programme offers many advantages to European companies and the European ecosystem as a whole. The following list will provide an insight into the benefits SMEs experienced during the participation.

1. An ECSEL JU project offers the chance to **get to know the whole ecosystem and including all players from the value chain**. This enables a broadening of every companies understanding of their industry sector and the ecosystem as a whole. For SMEs, this is particularly relevant in order to establish and maintain collaborations with large companies. This provides multiple benefits such as a better access to and understanding of the market and advancement of know-how of less familiar technologies. For proactive SMEs, the contact to large companies also enables access to important research capabilities that allows smaller companies to do "Champions League" level research and product development.

"These projects provide an ideal environment to foster innovation and collaboration. Objectives are challenging enough to raise your skills. We get the chance to check our assumptions and share common problems beyond our close market. They help us broaden our views and gain experience that we can later apply in our development processes and, eventually, our customers. They make us learn and move out of our comfort zone."

Figure 2: Quote - ULMA Embedded Solutions

2. **Dissemination and exploitation actions are combined**. This includes a couple of benefits such as a higher visibility towards the European and Global market at lower resource investment. Conferences, exhibitions and fairs not only strengthen the internal community but represent bright beacons to any external stakeholders.
Internally, the management of Intellectual Property is legally regulated under the consortium agreement and supported by experienced personnel leading to a trust-based sharing attitude between otherwise competing industry players. This enables SMEs to gain insight into the working operations of large players readily open for provision of technology and know-how.
3. The extensive consortium gathered around the figurative campfire of the projects' proclaimed content opens room for further discussion and realisation of topics outside of the project. Many **bilateral and often long-lasting relationships** are formed leading to an even greater industry-wide development than just through the project results alone. Intrigued and challenged by the project's proposition, these project-external bilateral collaborations lead to

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technological and product developments outside of the ECSEL project. This in turn further strengthens Europeans economic position in the global market.

4. Through the participation of players from the whole industry, cross-cutting issues such as **standardisation** or pushing for certain policies can be discussed and decided and might just be adopted in general. This benefits SMEs in the long run as they can make use of standardised parts and infrastructure, thus facilitating the adaption of technology otherwise inaccessible to them.
5. In the context of a research-based project, consortia are **more open to testing** of prototypes than the general end-user. The involvement of industry and academia increases the speed of product development to market readiness. Through partaking in the ECSEL ecosystem SMEs have possibility to acquire insider knowledge and stay ahead of the technological curve.

3.1.3 Pains

However, there were also some difficulties SMEs had to face during the consortium building, the proposal phase and during the project itself.

1. As ECSEL projects are industry driven the **big players can exert their naturally large influence** in the conceptualising of a project. Additionally, these larger players often heavily distribute to the critical content of the project. This also implies that the big players with their established infrastructure set the pace of development which can be challenging for SMEs with fewer resources which have to be split between R & D, administration and procedures and the coordination of meetings. To become part of the process SMEs should already have a working connection to the network forming the consortium.
2. The above-mentioned issue combined with a limited national funding budget has the implication, that the selection process of projects experiences a push **towards consortia including a nationally important stakeholder**, when applying for funding. Depending on the country, this can lead to difficulties with the co-funding between the European Commission and the state, as described in the next point.
3. The **splitting of ECSEL project funding** between the European Commission and the individual member state leads to complications during the application process. Especially SMEs need to plan their actions carefully. Even if the European Commission agrees on funding a proposal, the national government can still opt against it. A state's internal agenda might lead to the selection of only one proposal, and therefore to the exclusion of another proposal which might already have been accepted by the EC. And even if the already accepted proposal is not rejected by state authorities, the delay in decision making can be enough to harm an SMEs economic planning.

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4. The **administration** of a project in a large consortium is **complex**. This is true not only for the coordinator of the project but also for individual companies. This becomes an issue in several ways:
 - The **application process requires a long time** in respect to the general development of the ECS industry. This is due to several reasons such as finding and engaging the right consortium, writing and agreeing on the final proposal and waiting for the successful receiving of the funding in two stages.
 - During the project, it is **difficult for SMEs to react to changes** in their immediate surroundings. Once the goals in the proposal are set, they must be met even if the individual company must adjust their usual operational tasks to these challenges.
 - A large amount of administration is required so that a very large consortium doesn't transform into an archipelago of isolated developments.

These issues are particularly concerning to SMEs as the proportion of research/operational activities and administrative activities cannot grow over a certain level.

3.1.4 Solutions

Each of the above-mentioned obstacle can be met with certain adjustments in the programme or with a best practice code executed by the coordinators.

1. To overcome the obstacle of delayed national decisions and the long application-to-funding-time, it was suggested to restructure the process in a way, that the European and national research agendas and respective funding capabilities are agreed on beforehand. This way, the individual nations can still allocate their available funding to ECSEL projects but the decision process and subsequent withdrawal of funding to individual projects could be avoided. This would be particularly attractive to SMEs as this could decrease the challenges of complicated and uncertain applications and long economically challenging waiting periods. However, the improved communication and collaboration between the European Commission and the national funding bodies will generally increase the potential to develop and deploy projects in accordance with the current (fast changing) state of the art and thus enhance its relevance and impact.
2. Another option could be the creation of a **dedicated track for small and medium** sized companies. This points to an increase of possible project sizes within ECSEL.
3. It was suggested to establish a **mentorship programme for SMEs** or universities to lower the entry barrier to the community. Dedicated and European Commission funded entities could play a role not only in helping with administrative tasks and communication, dissemination and exploitation but use this chance to increase visibility of the programme.

4. To overcome the obstacle of complexity of consortia it would be helpful to create a **partner radar** accessible to all current partners of a consortium which is partially implemented by the EFFRA Innovation Portal². Through a process of application, this information could also be made accessible to external partners looking to join a consortium without having an extensive network already. This simplification of joining a consortium will especially **help SMEs as they might not be as well connected** as some of the larger companies or have the resources to spend on online searches.

3.1.5 Lessons Learnt

In this paragraph, participating SMEs gave voice to their lessons learnt and what to focus on during the varying stages of a project.

1. As these ECSEL projects can grow to large workloads, it is recommended SMEs to **stay focussed on their company's own roadmap**. It is important to keep on developing one's own operations instead of putting all efforts into the project. Especially SMEs with their often-limited resources should avoid revolving exclusively around the challenges and potential of an ECSEL project.
2. Due to many of the aspects mentioned above such as the large consortia, complex structure, long proposal-to-funding time and the many possibilities the ECSEL JU programme offers SMEs, it is recommended **not to focus on the funding alone**. The funding should enable an SME to participate in the first place and partially cover the expenses along the way. However, strategic planning is crucial to optimally further the technological and economic development the core company.

"This kind of initiatives are a big chance to join the European Research and Innovation ecosystem, to increase your business network and to get funding which can lead you to the next step."

Figure 3: Quote - Savvy Data Systems

3. **Be thorough**. The better the SME understands the ecosystem, the partners and the current state of the art, the more they can take from an ECSEL project. SMEs can look at previous calls, use Cordis³, Ideal-Ist⁴ or other mapping tools to avoid being overwhelmed by the number and

² <https://portal.effra.eu/home>

³ <https://cordis.europa.eu/de>

⁴ <https://www.ideal-ist.eu/>

variety of partners. Also, it is recommended to find somebody who can guide them through the process.

4. When looking for suitable partners it has proven more successful to **identify and search for capabilities and roles** in the project rather than for companies. It is more relevant what a company specialises in, within and outside of the ECSEL project, than who the company is and where it is positioned in the market.

3.1.6 SME engagement

Generally, **every company** can and should apply for an ECSEL JU project. However, it is recommended from experienced SMEs that the company should have **some years of experience** preferably in other European programmes with smaller consortia, and a **medium to high Technology Readiness Level** (TRL). As stated above, it is important to have one's own strategic planning in order and then use the project as a potential incubation ecosystem to develop new partnerships and products.

As ECSEL projects offer long term collaboration and a possibility to shape the future development of the respective industry it is particularly suited for companies with a **vision and ambition**. ECSEL offers the chance to develop a company to the next level, delivering advanced technological solutions throughout Europe and beyond.

3.1 Interview with DAC.digital⁵

3.1.1 Benefits of large consortia

“ECSEL projects provide partners, especially SMEs, with access to engineering frameworks and technology platforms which are of interest for industry leaders. These projects are driven by large enterprises who have position and capacity to shape future industrial and business landscape. This is an opportunity for smaller companies to learn about the requirements and strategic technology developments taking place in big, multinational corporations. For example, in Productive4.0 project DAC found partners, potential customers, with whom we worked on the requirements for our technological solutions. But, up the value chain, we have also got connected to our suppliers. Also, competing companies can work together to do certain things faster and cheaper, they can reduce R&D costs, use common testbeds or split costs related to standardization processes. In ECSEL, all this can happen in one project.”

3.1.2 Macro-economics

“In ECSEL projects, partners are not bound by a specific product or a specific technical problem, which is to be solved. Here, the binder consists of market relations and joint market outlook. Expected impacts

⁵ Paraphrased from original Interview with DAC

of the project foreseen in the proposal are defined in terms of the EU competitiveness, an increase of European export volume, GDP growth, or job creation in the EU. It's macroeconomics.

So, a good advice to SMEs and any other industrial partners is to think about existing partners, suppliers, and consumers as they might be part of the ecosystem already. If are working locally with a university or research organization, draw their attention to ECSEL, they might have already a connection to experienced players, insiders. Or simply attend one of the ECS community events and approach your desirable partners, suppliers, or customers directly, face-to-face. Being a part of their value network and having something to offer will facilitate the connection to a consortium where specific competencies are required.”

3.1.3 Embedded intelligence

“ECSEL supports the dynamics of today’s digital, connected world: The president of ARTEMIS took the opportunity and presented main findings of the report on trends and challenges in the embedded intelligence sector. In general, the point is that the embedded intelligence is at the very core of the “new industrial revolution”, bridging between the world of physical processes and digital services. The study foresees that the value is shifting along the electronics value chain itself. It moves from electronic components towards systems of systems and complex applications. By 2025 the value of the last stages of the chain, which are fully integrated systems and downstream applications, will grow by 22 times while the value of electronic components segment will just double.”

3.1.4 Disbursement of Funds

“The disbursement of funds by the coordinator to consortium members can vary from project to project. Sometimes the pre-financing part is retained by the coordinator and paid out after some time. Sometimes the advance payment quote transferred to partners is lower than the quote indicated in the grant agreement. These issues should, of course, be regulated by the project consortium agreement. However, the final document is usually negotiated in the course of the project. It might even be that this process will last until the end of the first year of the project, or even longer.

It is not necessarily up to ECSEL to intervene because it is the internal issue of each consortium. Nevertheless, it would be worth looking at this issue and maybe proposing some good practices, regarding payment planning and timely notification to consortium members. For SMEs, it is especially important to have a standard, predictable payment flow. Delays and unclarity about payment process might be severe as it affects budget planning and financial liquidity. The other thing is how national funding is handled. Last year at EFECs 2018 in Lisbon, I had a pleasure to take part in a panel discussion concerning the situation of SMEs in the ECSEL ecosystem. Among others, we have discussed cases of undefined national budgets. It turned out that in some of the consortia under ECSEL, there are partners who learned, once the project was already selected for funding or even already going on, that there will be no national funding in a call that has been just closed! This should be known in advance, prior

to the call announcement, because, again – especially for SMEs, preparation of a proposal is a considerable effort and investment.”

4 Recommendations for Future Engagement Strategy

The conducted interviews described some enormous benefits such as potential for business development created by the large consortia. These benefits often include a whole value chain, offer the possibility to shape an entire market and meet future clients and suppliers in an intimate setting. Aside from those benefits, some obstacles especially for SMEs were described. Through the analysis of the conducted interviews as seen above, there are some overarching themes creating these hurdles which do not stop SMEs from participating but could be design in a way, that would allow for an improved experience.

4.1 Visibility

As seen in the first set of questions under section 3.1, the ECSEL programme is not well known to SMEs. This might be due to the fact that communication, dissemination and exploitation is done by the coordinator or some other industrial partner. Additional to a more general communication strategy for the ECSEL JU programme, professional technology transfer companies such as AquaTT or Steinbeis don't usually become involved in ECSEL projects as the funding rate is limited to 70 %. This input will come partly through the deliverable D3.3 *Guidelines for communication, dissemination and exploitation in the frame of the LI4.E* which will help companies on their mission for an improved outward presentation.

Hence, to improve general visibility of projects and the ECSEL programme itself and to increase impact of exploitable results it should be considered to give a special role to a communication, dissemination and exploitation partner which

- Designs a wholesome communication, dissemination and exploitation roadmap in cooperation with consortium
- Establishes a project identity kit and provides communication, dissemination and exploitation tools
- Analyses the highly complex Intellectual Property of the consortium, including foreground and background IP, exploitable results for the consortium as a whole and per partner
- Assists individual partners in IP issues and their communication, dissemination and exploitation
- Acts as spokesperson for the consortium in collaboration with overarching CSAs

The document *ECSEL GB 2019.118 - Annex 1st Amendment WP2019 v2 28012019 - clean final.pdf*⁶ available online covers some of the addressed visibility issues but could still be enhanced through dedicated partners.

4.2 Community

ECSEL is not only about outwards communication. A strong community will generate better and more results, push the joint vision and make the best use of all synergies. Obviously, communication takes place between the partners of a consortium to develop and promote the proposed project. However, to harness the full potential of the ecosystem built through the consortium it is imperative to grant every partner access to a comprehensive overview to all existing skills and capabilities. This could be accomplished through the following features:

- **Partner Radar/Matrix** featuring but not limited to contact details, capabilities, available resources and business propositions. The feature should include a marketplace search functionality to enable partners to not only work efficiently on the project content, but also develop their business in any direction.
- A **communication platform** such as the EFFRA Innovation Portal for internal partners and external companies listing all the existing consortia and their details as mentioned in the partner radar. This platform should be extended to be used for all communication within the consortium with different threads for the various subtasks.
- An **increased number of local events** (additional to EF ECS and ECS Brokerage) giving companies the chance to frequently meet in person without the need for large travel resources.

4.3 Consortium structure

Coordinators of large consortia are posed with complex administrative requirements in the proposal stage as well as throughout the project duration. Especially in SMEs, this can lead to a prolonged waiting time regarding funding and other administrative tasks. Consortia should be structured in such a way, that every partner's information and role become clear and accessible to every other partner. Committees and local subcommittees could be formed to be the point of contact for low resource SMEs to answer questions and solve administrative issues in a fast and efficient manner.

4.4 Bureaucracy

As much as the two-fold funding structure of ECSEL projects allows for a mandate of individual member states, it complicates the proposal process for partners which makes it especially difficult for

⁶<https://www.ecsel.eu/sites/default/files/2019-04/ECSEL%20GB%202019.118%20-%20Annex%201st%20Amendment%20WP2019%20v2%2028012019%20-%20clean%20final.pdf>

SMEs with restricted resources. The most efficient way to circumnavigate this obstacle is to agree on the research agenda before the projects start. For this to happen, national funding, research and industry agendas have to be analysed. To decrease the management of uncertainty and to simplify the participation of SMEs the national bodies and the European Commission should discuss and agree on a common agenda. This would also eliminate the issue of timing and having to wait for national funding as it seems to be the case in some member states. Thus, making it decreasingly unnecessary for individual consortium partners to spend resources on such things.

4.5 Cascade funding

Cascade Funding, also known as Financial Support for Third Parties (FSTP), is a European Commission mechanism to distribute public funding in order to assist beneficiaries, such as start-ups, scale-ups, SME and/or mid-caps, in the uptake or development of digital innovation. This funding method aims at simplifying the administrative procedures, creating a light, SME-friendly application scheme, by allowing that some EU-funded projects may issue, in turn, open calls for further funding⁷. The inclusion of this instrument in ECSEL projects could be used to call for experiments or small projects where SMEs (not in the consortium) could participate with a fast and lightened process. This can allow SMEs with restricted resources to participate in ECSEL projects in a simpler fashion. Apart from the direct possibilities through this instrument it could act as a trial for those SMEs thinking about joining a project.

5 Summary

The ECSEL JU programme is a great opportunity for all European companies to expand their horizon, meet stakeholders from all along the value chain, boost their R & D activities and shape their industry's ecosystem. Its greatest asset, the large consortia, also pose their greatest difficulty through a complex administrative structure. If these issues can be overcome through dedicated management entities, well-structured regulations and strongly implemented best practice guidelines the currently existing obstacles for SMEs can be circumnavigated. The issues of co-funding through the European Commission and national bodies can be mitigated by an increase coordination between the two respective entities setting a common agenda. An increased visibility can be generated through a more aggressive communication, dissemination and exploitation management which should be implemented advertising the newly implemented improvements. ECSEL's creation of an industry wide playground strengthens Europe's economy positioning it at the cutting edge of technological advance.

⁷ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/competitive-calls>

6 Annexes

6.1 Interview form used at the EF ECS 2019



EF ECS 2019- Interview Questions Sheet



Questions for SMEs

1) What is special about the ECSEL projects compared to other programmes (USP)?

2) Gains / good points / benefits

- Why is it beneficial to be part of an ECSEL (LH) projects (good points, success stories, arguments for other SMEs).
- How did your SME benefit from the program / partnership / technological developments?
- What impact did it have on your business? What were the biggest gains?

3) Pains, bad points

- What are/were the biggest 'pains' for you
- What are barriers for you / other SMEs to participate?
- Where are/were your main difficulties regarding proposal / implementation?

4) Solution

- What could/should be changed to overcome the difficulties?
- What would you recommend the EC to do?
- How could the program be made more attractive for SMEs?

5) Lessons learnt

- What are your personal lesson learnt?
- What recommendations would you give to other SMEs?

6) SME (optional, target group, Dissemination)

- How would you describe the type of SME that can benefit most from such a program (size, TRL, ... target group)
- Where can SMEs learn about the program / how can they be attracted/informed?

Can we share your views with the EC and also public? Can we mention your name / organisation?

1 (1)



This project has received funding from the ECSEL Joint Undertaking (JU) under grant agreement No 830845. The JU receives support from the European Union's Horizon 2020 research and innovation programme and Ireland, Finland, Spain, Germany.

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6.2 Screenshot of the EU Survey online tool



SME experience of participation in the ECSEL-JU programme

We, as the CSA Industry 4.E, are striving to improve your experience and enhance impact of the Industry 4.E Lighthouse Projects. This is your chance to improve the ECSEL JU programme. Please take a couple of minutes to fill out these 6 questions and we'll do the rest.

Thank you!

What is special about the ECSEL projects compared to other programmes (USP)?

Gains / good points / benefits

- Why is it beneficial to be part of an ECSEL (JU) projects (good points, success stories, arguments for other SMEs)?
- How did your SME benefit from the programme / partnership / technological developments?
- What impact did it have on your business? What were the biggest gains?

Pains / bad points

- What are/were the biggest 'pains' for you?
- What are barriers for you / other SMEs to participate?
- Where are/were your main difficulties regarding proposal / implementation?

Solution

- What could/should be changed to overcome the difficulties?
- What would you recommend the EC to do?
- How could the programme be made more attractive for SMEs?

Lessons learnt

- What are your personal lessons learnt?
- What recommendations would you give to other SMEs?

SME engagement

- How would you describe the type of SME that can benefit most from such a program (size, TRL, ... target group)?
- Where can SMEs learn about the program / how can they be attracted/informed?

Name

* Organisation

* Number of employees

1-10

11-50

51-250

+ 251

In which programme have you been/are you involved?

ECSEL

Horizon2020

FP7

* Can we share your views with the EC and also publicly? Can we mention your name / organisation?

For more information, please read our [Privacy Policy](#).

Yes

No

This questionnaire will be generated into a report. If you wish to receive a link to this report, please provide your email address.

[Privacy Policy](#)



Submit

6.3 Full interview with Mateusz Bonecki

The idea behind the interviews is to share the process and the benefits of being involved with ECSEL-JU projects, from the perspective of successfully engaged SMEs, with other SMEs to encourage their involvement in the ECSEL-JU programme.

Proposed Questions

The following are the proposed questions for our interview with Mateusz Bonecki (DAC).

Q1. As an SME (or any industry partner), why did you decide ECSEL-JU was a good way of funding your R&D?

First of all, because of technology. DAC is interested in IoT security, IoT integration or DevOps for embedded systems engineering. In addition, data analytics applications that use data from IoT.

Of course, application domains are also relevant. We develop systems for industry, logistics and urban mobility, and we were looking for a place that will be open to demonstrators, tests and pilot deployments in these areas. We found it in the ECS Strategic Research Agenda and, in consequence, in ECSEL.

Finally, innovation actions, also those with an active research component, are focused on bringing innovation to the market, and therefore on commercialization. This approach is specific for the entire Horizon 2020, and ECSEL in particular. In general, the EU-funded research projects leverage the R&D expenditure. But on top of that, ECSEL-scale projects give access to numerous companies and research organizations brought together in large consortia. You may meet there your competitors, your suppliers, and perhaps also your potential clients.

There are other advantages significant from the industry point of view. ECSEL addresses relatively mature technologies, say, TRL 6 or 7. It is also an industry-driven initiative, so the use cases and demonstrators are defined by industrial partners.

Of course, there are some drawbacks of working in large consortia. You might invest a couple of months in work on a proposal, and then it suddenly turns out that the consortium breaks up because the largest enterprise coordinating the application process changed its strategy and now quits the team. Or there is a merger with another consortium, and your topic of interest is off the table overnight. However, such a risk is present in all the business. The sales process looks exactly alike: how many offers have salespeople drafted that led nowhere?

Q2. What were your initial steps? Had you previously been involved in other EU projects before ECSEL-JU?

Our first experience with European programmes starts with the 7th Framework Programme. More precisely, it began with the predecessor of ECSEL-JU, the ARTEMIS Joint Undertaking, call of 2012. It was, moreover, the first call in which Polish partners took part as back then Poland has just joined the JU.

The goal of the project was to implement a semantic middleware platform supporting the integration of urban cyber-physical systems, using methodology and architectures typical for systems of systems engineering. The platform was intended to reduce the time needed for the development of smart city

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software applications which will utilize capabilities of systems across different urban domains such as energy, mobility, security, smart buildings, and so forth.

The project concluded not only with a successful pilot deployment in Gdańsk, our hometown, but also led to some commercial follow-ups. Certain components our company developed as part of the platform are still in use. Recently, we've boasted of finishing the work on a solution supporting real-time and open access to urban mobility data. We use the semantic middleware components, ensuring secure access to data offered by safety-critical systems such as, for example, intelligent transportation systems controlling traffic lights. CSA-Industry4.E SME Engagement Interview Qs

Q3. Was your first experience of ECSEL-JU project application successful?

Unfortunately, not. In the first call of the newly created ECSEL-JU in 2014, we failed with the consortium coordinated by Fraunhofer-Gesellschaft. Together with over 30 partners, we proposed an adaptive control architecture for cyber-physical systems. We were interested in the application of this technology in the field of smart city, more precisely, in the field of smart urban mobility due to our presence on this market. Still, we've learned a lot as a team during this first ECSEL application process, which helped us in the following calls.

Q4. How many ECSEL-JU applications have you been involved in?

At ECSEL-JU, our company has been a member of 15 consortia so far. But we have been successful in three cases, which gives a 20% success rate. We focused mainly on projects on the borderline of smart mobility and digital industry, which fits our portfolio of solutions for logistics 4.0 and the broadly understood transportation, logistics, and shipping sector.

In 2017 we succeeded with the AFarCloud project, which in due course undertook the topic of cyber-physical systems for smart agriculture, which was quite neglected at ECSEL. This year we have just started working in the Arrowhead Tools consortium.

And earlier, in 2016, funding was granted for Productive4.0 project, which perfectly fit the needs of the European economy facing the challenge of industry digitalization. In this case, a consortium of more than a hundred partners responded with one voice to the needs identified in the Digitizing European Industry strategy concerning industrial platforms and large scale pilots. What worked here is almost thirty industrial use cases handled within a unified approach towards industry digitalization.

Q5. Of the applications you were involved in, what are the differences between those that were successful and those that weren't?

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ECSEL is a sectoral program dedicated to the European electronics, embedded systems and cyber-physical systems domain. To my mind, it is the right consortium what makes a successful proposal: consortium coordinated by large industrial players, that meets the needs and priorities outlined in the MASP and work programme, but also the economic needs of the EU member states.

It is the case in ECSEL because once independent experts evaluate the submitted proposals, the floor is given to the panel of public authorities, who have an impact on the final ranking list. Their assessment says how the project fits the needs of state-level economies and respective policies and strategies. That is why it is so important to be aware of the demand of the European economy. Good proposals capture technological, political, and economic *Zeitgeist*.

Q6. What has your company achieved through engagement in ECSEL-JU that you think it wouldn't have otherwise?

Three things are unique about the ECSEL funding instrument. Firstly, it supports large-scale ecosystem projects, where all stages of the value chain are represented. A consortium of fifty, seventy partners is nothing unusual. Some consortia gather even more than 100 partners. Secondly, ECSEL projects provide partners, especially SMEs, with access to engineering frameworks and technology platforms which are of interest for industry leaders. Thirdly, these projects are driven by large enterprises who have position and capacity to shape future industrial and business landscape. This is an opportunity for smaller companies as we can learn about requirements and strategic technology developments taking place in big, multinational corporations.

So, to my understanding, ECSEL is about bringing together complete value chains, from semiconductor companies to manufacturers of standalone embedded systems to OEMs and, finally, to downstream solutions providers. Such ecosystem projects create something like “engineering sandbox” for end-to-end value chains. Different parties can experiment with each other's technologies in a way that wouldn't be otherwise possible. Each project ignites new partnerships due to the diversity of partners, their needs and competencies.

The benefits of experimenting in the living value chain offered by huge, ecosystemic projects are vital to the company's development. For example, in Productive4.0 project DAC found partners, potential customers, with whom we worked on the requirements for our technological solutions. But, up the value chain, we have also got connected to our suppliers. We have undertaken cooperation with Infineon or NXP in the field of reliable run-time environments compliant with the standards of Trusted Computing Group or concerning the application of Secure Element integrated circuits in development of trusted and secure IoT devices.

Q7. How important is having a large EU network to engage in ECSEL-JU?

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Business-wise, ECSEL Joint Undertaking, the Horizon 2020 program, and any other public funding instrument alike are, among others, means to leverage R&D investments. So from the entrepreneur's point of view, collaborative research is a part of the business. And just like in business, having partners is a condition of successful operations.

We don't live in a void: a more extensive network translates into a better understanding of the industry, cooperation prospects, access to know-how, contractors, suppliers, and finally – also customers.

Q8. How important is it to get engaged with partners who are already involved in ECSEL-JU?

Just like in business, having experienced, proven partners is crucial, but also very demanding. In business, this requires investment in networking, presence at fairs, promotion, understanding the industry and market dynamics, and developing lasting relationships with partners.

At ECSEL, but also in European collaborative research in general, the right partners can be reached through brokerage events. We have the EF ECS conference that brings together all the actors of the ECS value chain. There are online match-making tools to find business-soulmates, join forces and forge alliances.

But, on the other hand, ECSEL is an industry-driven program. And very often it happens that functioning on the European or global market is a step towards collaborative R&D where the cost of this experiment is partially covered by public funds. So the usual practise outside the collaborative research and public funding can be brought into it: companies and research organizations focus on common interests and goals, OEMs and their suppliers or contractors pursue new products and markets, competing companies can work together to do certain things faster and cheaper, they can reduce R&D costs, use common testbeds or split costs related to standardization processes. In ECSEL, all this can happen in one project.

And this applies also to small businesses and start-ups. In ECSEL, we often observe that large enterprises, when setting up or joining a consortium, bring along start-ups or SMEs. They use ECSEL projects as an environment to leverage risks related to testing, integration or absorption of some unique technologies smaller entities are working on.

Q9. What advice would you give to an SME (or any industry partner) trying to get involved in ECSEL-JU?

The essential advice would be that one must understand what the specificity of working in ECSEL projects is and what they can offer. And all in all, this is easiest to explain by showing the differences between the different funding mechanisms.

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To start with, the European Innovation Council implements the SME Instrument programme, which has been designed to leverage R&D investment and commercialization costs in single, smaller entities. These projects can be carried out in twelve to eighteen months. They are perfect for start-ups and SMEs who have to quickly develop MVP and introduce it to the market as fast as possible to win a reasonable market share. So, if you have some disruptive technology at hand, that's the place for you: you're on your own, concerned only with your product or technology.

On the other hand, typical collaborative Horizon 2020 research or innovation projects have entirely different structure and pace. They usually involve academic and research partners as well as industry, both large and small enterprises. Here you are supposed to solve a technical, organizational, or societal problem. But you need to work with five, maybe ten other partners in the consortium. You need to synchronize, plan together, share requirements, coordinate development, integrate components released by various parties. This workflow could be painful if you want to proceed fast. There is a risk that your competition will outrun you. I can imagine a situation where half of the start-up team is stuck on teleconference calls, discussing work packages, deliverables, and deadlines, while competitors focus on business models, building a customer base, and developing a go-to-market strategy.

Now, try to extend this picture so that it includes a complete value chain, the entire European electronics market, involved OEMs and their suppliers, and so forth. In ECSEL projects, the protagonists are complete value chains. Their task is to jointly check whether the European electronics sector, together with companies that use its products, has the chance to develop long-term, sustainable, innovative products or solutions. So ECSEL takes the perspective of the entire ECS sector, and if you can find your place in it, that's great.

In ECSEL projects, partners are not bound by a specific product or a specific technical problem, which is to be solved. Here, the binder consists of market relations and joint market outlook. Expected impacts of the project foreseen in the proposal are defined in terms of the EU competitiveness, an increase of European export volume, GDP growth, or job creation in the EU. It's macroeconomics.

So, my advice to SMEs and any other industrial partner would be: think of your existing partners, suppliers, and consumers as they might be part of the ecosystem already. If you are working locally with a university or research organization, draw their attention to ECSEL, they might have already a connection to experienced players, insiders. Or simply attend one of the ECS community events and approach your desirable partners, suppliers, or customers directly, face-to-face. If you are a part of their value network and you have something to offer, sooner or later you will find a consortium where your competencies are required.

Q10. What do you think that ECSEL-JU should do to support further SME engagement?

Recently, the ARTEMIS Industry Association, one of the private members of the ECSEL-JU, has taken part in the fourth Viva Technology conference in Paris. Many small companies and start-ups were interested in what we are up to, and some of them decided to join our association.

Why? I believe that they have understood something important about the dynamics of today's digital, connected world. During VivaTech, Jean-Luc di Paola Galloni, the president of ARTEMIS, took the opportunity and presented main findings of the report, recently released by the association, on trends and challenges in the embedded intelligence sector. In general, the point is that the embedded intelligence is at the very core of the "new industrial revolution", bridging between the world of physical processes and digital services. The study foresees that the value is shifting along the electronics value chain itself: it moves from electronic components towards systems of systems and complex applications. By 2025 the value of the last stages of the chain, which are fully integrated systems and downstream applications, will grow by 22 times while the value of electronic components segment will just double.

I think that this is the opportunity for ECSEL to attract smaller companies. There is a place for dynamic, agile innovators who will play an important role in generating value through applications and solutions developed on top of smart, connected, intelligent systems.

Interestingly, this trend is quite visible nowadays. Large, multinational OEMs are recently more and more interested in SMEs and start-ups that develop value-added services and applications in the last segments of the value chain. The best example is car manufacturers' investments in companies emerging in the field of mobility as a service, car sharing, last-mile logistics, and so on. For instance, in the last two years, BMW has invested in several companies working on carpooling apps, roadside assistance platform, or smart parking solutions.

Q11. What recommendations would you make to the ECSEL-JU for future funding?

From a small enterprise perspective, although probably not only, you need a standard, predictable payment flow. But at the moment, there are significant discrepancies between consortia in how pre-financing and interim payments are done. And I don't mean the procedure of the JU transferring funds to the coordinator, because it is very clearly written in the grant agreement and complied.

We are currently involved in three ECSEL consortia, and the method of disbursement of funds by the coordinator to consortium members was different each time. Sometimes the pre-financing part is retained by the coordinator and paid out after some time. Sometimes the advance payment quote transferred to partners is lower than the quote indicated in the grant agreement. These issues should, of course, be regulated by the project consortium agreement. However, the final document is usually

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negotiated already in the course of the project. It could be that this process will last even until the end of the first year of the project, or even longer.

As said before, I am aware that it's not up to ECSEL to intervene because it is the internal issue of each consortium. Nonetheless, it would be worth looking at this issue and maybe proposing some good practices, in particular regarding payment planning and timely notification to consortium members. The thing is that for SMEs, in particular, delays, and unclarity about payment process might be severe as it affects budget planning and financial liquidity.

The other thing is how national funding is handled. Last year at EFECs 2018 in Lisbon, I had a pleasure to take part in a panel discussion concerning the situation of SMEs in the ECSEL ecosystem. Among others, we have discussed cases of undefined national budgets. It turned out that in some of the CSA-consortia under ECSEL, there are partners who learned, once the project was already selected for funding or even already going on, that there will be no national funding in a call that has been just closed! This should be known in advance, prior to the call announcement, because, again – especially for SMEs, preparation of a proposal is a considerable effort and investment.

6.4 Vehicle of the Future Cluster Initiative meeting hosted by IMR

At the Vehicle of the Future event at Irish Manufacturing Research (Mullingar) on the 28th February 2019, a group of 40 SMEs was interviewed about their knowledge of the ECSEL JU programme.

Abbey Machinery	Dromone	Keenansystem	OverHaul
Accelerate consulting	Electro Group	Keyplastics	Realtime Technologies
Arralis Ltd.	Electroautomation	Lero	Taoglas
Atsr	Emdalo	Mchale	Thenetsgroup
Bolgers	ENBIO	Mergon	Timoneygroup
Burnside	EPS Global	Mobacar	Transpoco
Combilift	G&G Engineering	Multihog	Ventac
Cubiclecom	IDASO	MySafeDrive/ ProVision CameraMatics	Xerotech
Drive-Rite	Innalabs	Nuvotem	Croom Engineering
Driveriteair	Kcmg-Crdc	NVD Ltd	Irish Micro Mouldings

Table 1: List of interviewed companies at VotF Event

The attendees were asked the following question about ECSEL funding:

Are you aware of ECSEL Funding?

- 35/40 had **no awareness of its existence**, but could not give any details
- 38/40 were aware of the existence of H2020
- 7/40 had some knowledge of H2020
- 1/40 had received cascade funding in H2020

Question	Answer	Ratio
1. Have you heard of ECSEL?	Yes / no	2 / 38
2. If yes what do you know?	Through another company in ECSEL At a conference	
3. Have you heard of H2020?	Yes / no	7 / 33
4. If yes what do you know?	<ul style="list-style-type: none"> received cascade funding based on college research hearing about it at a conference hearing about it in IMR hearing about a company that got funding in a project had engaged in a proposal with a consultancy company and decided to opt out close to proposal submission “the time taken would not get the money that they could get elsewhere with less effort” too much administration for very little money didn’t have anyone in the company that could support that type of work didn’t know enough about it 	

Table 2: Questions raised to 40 attendees at IMR VotF conference