2019

ANNUAL ACTIVITY REPORT

ECSEL Joint Undertaking

Electronic Components and Systems for European Leadership

In accordance with Article 22 of the Statutes of the ECSEL JU annexed to Council Regulation (EU) No 516/2014 and with Article 23 of the Financial Rules of the ECSEL JU.

In pursuance of Regulation 2018/1046 adopting the financial rules applicable to the general budget of the Union[1] and Delegated Regulation 2019/887[2] adopting the model financial regulation for public-private partnership bodies referred to in Article 71 of Regulation 2018/1046, adopted by ECSEL Governing Board[3] with effect as from 01.01.2020.

The annual activity report is made publicly available after its approval by the ECSEL JU Governing Board.

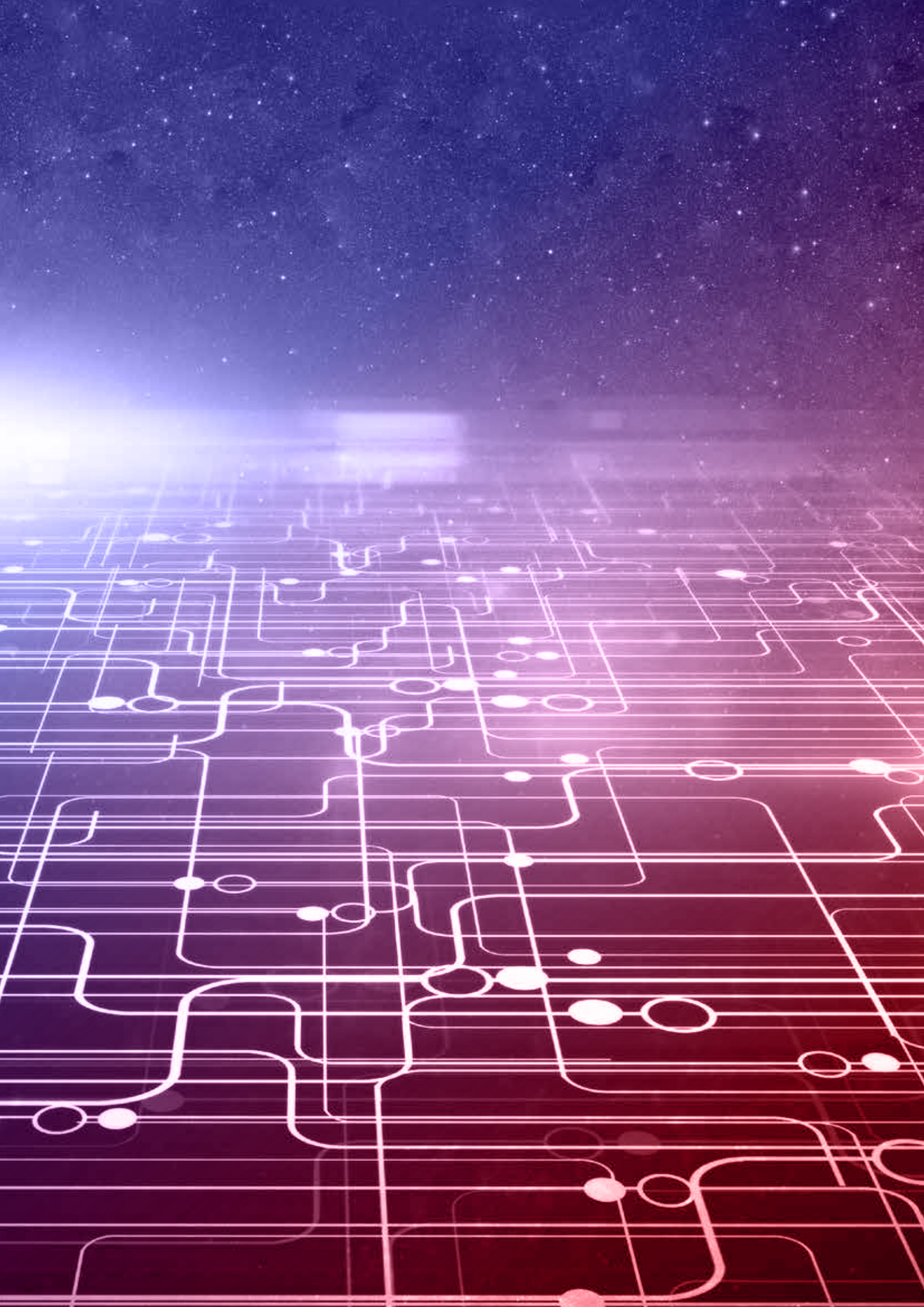
It is based upon the template communicated by the Common Support/ Implementation Centre for Horizon 2020 Annual Activity Reports.

1 Regulation (EU, Euratom) 2018/1046 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 July 2018 on the financial rules applicable to the general budget of the Union,

2 Commission Delegated Regulation (EU) 2019/887 of 13 March 2019 on the model financial regulation for public-private partnership bodies referred to in Article 71 of Regulation (EU, Euratom) 2018/1046 of the European Parliament and of the Council.

3 Decision ECSEL GB 2020.138 of 26.02.2020

Table of Contents



1 Introduction and Fact Sheet

On 10 July 2013, the European Commission issued their proposal for the "Innovation Investment Package" to the budgetary authority. This included the establishment of Joint Undertakings (JU's), implementing Joint Technology Initiatives, among which the JU on "Electronic Components and Systems for European Leadership ECSEL". The Council adopted the Regulation on 6 May 6 2014 and published it in the Official Journal on 7 June 2014. The Regulation entered into force twenty days later, on 27 June 2014, and ECSEL JU came into being, as the merger of two pre-existing JU's, ENIAC and ARTEMIS, also taking up activities of the European Technology Platform on Smart Systems Integration "EPoSS".

The ECSEL JU, as the acronym indicates, addresses Electronic Components and Systems: a capability of essential importance for each citizen, company and nation in the world. Information and communication technology and its applications all run on this fabric: no industrial product, no entertainment, no transport system is conceivable today without them. Already, the physical and economic well-being of every citizen and society is supported by electronics applications, from healthcare and personal safety to entertainment and safer transport. They are also the main drivers for innovation which, in turn, is the foundation for job creation and economic growth. The trend will become stronger in the future, creating increasingly interconnected devices with unprecedented capabilities, enabling the Internet of Things and the incorporation of ICT in all industrial branches: the very essence of the contemporary industrial revolution described as "Industry 4.0".

ECSEL JU – a Public-Private Partnership–is targeted at re-establishing European leadership in an area of systemic importance for the European economy, and of strategic importance for Europe's security and long-term well-being. It is organised as a Joint Undertaking established under Article 187 of the Treaty on the Functioning of the European Union (TFEU). ECSEL JU will support this goal by supporting collaborative, industrially-relevant Research, Development and Innovation projects financed by the participating industrial and academic partners, and also by the EU (through the "Horizon2020" programme of the European Commission) and by the National/Regional funding authorities of the countries of the participants – a so-called "Tri-partite funding model".

The ECSEL JU Members are the Union (represented by the European Commission) and the ECSEL Participating States (EPS) collectively forming the Public Authorities Board (PAB), and the Private Members (the industrial associations AENEAS, ARTEMISIA and EPoSS) grouped to form the Private Members Board (PMB). At the end of 2019, ECSEL JU had the following EPS as members: Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom. Switzerland had joined the ECSEL JU in 2018, and Luxembourg signed its Administrative Agreement with ECSEL JU in 2019.

ECSEL JU's highest governing authority is the Governing Board, comprising representations from the Commission, the EPS and the private members' Associations AENEAS, ARTEMIS-IA and EPoSS ("industry", including SME's and research institutes). The Governing Board is responsible for all operational aspects of the Joint Undertaking, in particular for the strategic RD&I work to be done (via the Multi-Annual Strategic Plan) and the annual implementation of that plan (Work Plan). Funding decisions of projects selected from Calls are solely the responsibility of the Public Authorities Board, comprising the Commission and the EPS (strictly no industry involvement).

Name	Electronic Component and Systems for European Leadership (ECSEL) Joint Undertaking (JU)
Objectives	The ECSEL JU shall have the following objectives: • to contribute to the implementation of Regulation (EU) No 1291/2013, and in particular part II of Decision 2013/743/EU; • to contribute to the development of a strong and globally competitive electronics components and systems industry in the Union; • to ensure the availability of electronic components and systems for key markets and for addressing societal challenges, aiming at keeping Europe at the forefront of technology development, bridging the gap between research and exploitation, strengthening innovation capabilities and creating economic and employment growth in the Union; • to align strategies with Member States to attract private investment and contribute to the effectiveness of public support by avoiding an unnecessary duplication and fragmentation of efforts and by facilitating the participation of actors involved in research and innovation; • to maintain and grow semiconductor and smart system manufacturing capability in Europe, including leadership in manufacturing equipment and materials processing; • to secure and strengthen a commanding position in design and systems engineering including embedded technologies; • to provide access of all stakeholders to a world-class infrastructure for the design and manufacture of electronic components and embedded/cyber-physical and smart systems; and • to build a dynamic ecosystem involving Small and Medium-Sized Enterprises (SME's), thereby strengthening existing clusters and nurturing the creation of new clusters in promising new areas
Founding Legal Act	Council Regulation (EU) No 561/2014 of 6 May 2014 establishing the ECSEL Joint Undertaking[4] (referred to in the following as the REGULATION)
Executive Director	From 1 January 2016: Bert De Colvenaer
Governing Board	Chair: Dr. Sabine Herlitschka Members: see Chapter 6.1.1
Public Authorities Board	Chair: Ben Ruck (and as of November 2019 Doris Vierbauch) Vice-chair: Kari Leino Members: see Chapter 6.1.3
Private members Board	Chair: Rotating Chair: In 2019, the position was held by Jean-Luc di Paola-Galloni of ARTEMIS-IA. Members: see Chapter 6.1.4
Staff	30 (see Chapter9.3)
Work Plan	GB.2019.118–Amendment Work Plan 2019 https://www.ecsel.eu/sites/default/files/2019-04/ECSEL%20GB%202019.118%20-%20Annex%201st%20Amendment%20WP2019%20v2%2028012019%20-%20clean%20final.pdf

2019 final adopted/voted budget	**Commitment appropriations:** 198,207,919.41 EUR for operations (H2020) 5,325,000 EUR for administration: EU Administrative Contribution: 2,057,838.00 EUR Industry Administrative Contribution: 3,142,162.00 EUR Reactivation of unused appropriations from previous years: 125,000.00 EUR **Payment appropriations:** 226,521,097.07 EUR for operations (FP7 and H2020) 5,590,881.24 EUR for administration
Budget implementation on the total budget 2019 (*)	**Commitment appropriations:** 99.97 % for operations – H2020 (198,207,919.41 EUR) 99.95 % for administration (5,325,000 EUR) **Payment appropriations:** 80.19 % operations – FP7 and H2020 (181,988,692.03 EUR) 91.54 % administration (5,120,293.70 EUR)
Grants	12 grants were signed in Q2 2019 selected from two calls 2018, for a total cost of 798M EUR, a total EU funding of 201M EUR and a funding from the ECSEL Participating States of 195 M EUR
Strategic Research Agenda	GB 2018.114 -MASP 2019 https://www.ecsel.eu/sites/default/files/2019-01/ECSEL%20GB%202018.114%20-%20MASP%202019%20and%20Annex%20V1.1_0.pdf
Call implementation	Number of calls launched in 2019: 3 (1 RIA, 1 IA and 1 CSA) Number of proposals submitted (PO phase): 40 (including 1 proposal for the CSA call) Number of eligible proposals: 40 Number of proposals funded: 8 RIA, 6 IA, 1 CSA Global project portfolio ECSEL JU projects: 77 of which 14 in call 2019
Participation, including SME's	ECSEL JU (2014 to 2019 at FPP stage) Total number of participations in submitted proposals: 7608, of which SME's: 27% and private (for profit) companies (including SME): 63% Total number of entities in submitted proposals: 2681, of which SME's: 38% and private (for profit) companies (including SME): 72%

* Total budget includes, in addition to the budget voted by the Governing Board, appropriations carried over from the previous exercise, budget amendments as well as miscellaneous commitment and payment appropriations for the period (e.g. internal and external assigned revenue).

4 Council Regulation (EU) No 561/2014, OJ L169, 7.6.2014, p.152.

2 . Foreword by the Executive Director

At the end of November 2019 President-elect von der Leyen gave a speech in the European Parliament Plenary on the occasion of the presentation of her College of Commissioners and their programme.

Next to "***The European Green Deal*** *is a must for the health of our planet and our people – and for our economy*", she said "*Digitalisation is making things possible that were unthinkable even a generation ago. Communicating with one another worldwide, access to information, progress in medicine, environmental protection, mobility, inclusion:* ***there is no future without digitalisation***."

She continued: "*First, we must have* ***mastery and ownership of key technologies in Europe****. These include quantum computing, artificial intelligence, blockchain, and critical chip technologies. To do this, to close the gaps that exist now, we must act together. Let us pool our resources, our money, our research capacity, our knowledge. And let us put this into practice.*"

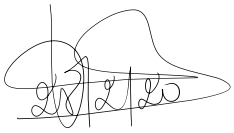
All the above is exactly what our Joint Undertaking has been and will be doing. And our new digital technologies will enable the realisation of the European Green Deal.

When planning for the future, we need to reflect on the past. A study by Deloitte and VVA has analysed the impact of ECSEL JU funded projects and concluded as follows : "Increased levels of research and innovation (R&I) cooperation between organisations is the single most important realised benefit of the ECSEL programme. Participation in ECSEL projects results in higher R&D spending for all categories of project participants and, ultimately, this yields a stronger and more innovative ecosystem of ECS players which can tackle EU societal and industrial challenges better."

The study describes the ECSEL R&I ecosystem to be characterised by Inclusivity, Multi-sectorial approach, Win-win relation between industry and research organisations, Inclusion of SME's, Openness and knowledge sharing, Trust and risk taking and Bridging to other funding programmes in Europe with its Lighthouse initiatives. All these characteristics are clearly recognised in the various ECS application areas : Industry, Health, Mobility, Energy, Society, … and come up and above the impressive technical results of the ECSEL JU project portfolio.

All the above are key building blocks for our future. Resources are limited: we have to use them efficiently and to allocate them to societal top priorities. Administrative simplification serves all and the whole ECSEL JU team and myself will be happy to implement this.

In 2019 we have reflected on the past; 2020 will be the year of the future of ECSEL JU.



28 February 2020

Bert De Colvenaer
ECSEL JU Executive Director

3. The Assessment from the Governing Board of the Annual Activity Report 2019 of the Executive Director of the ECSEL Joint Undertaking

This assessment of the ECSEL JU's past activities is being compiled at a time when the whole world is being faced with a pandemic which has already had a devastating impact on economies and individuals' lives across the globe. The importance of ICT (which depends upon ECS technologies to function at all) in facilitating continuity as well as its vital contribution in the medical field has never been clearer. In this period of great concern, the Governing Board is pleased to observe that the capacity for a significant contribution of the ECS technologies generally, and the community of actors participating in the ECSEL JU programme specifically, in providing major contributions to the recovery in both medical and in economic terms, is already inherent in the programmes' design and its remit. The Governing Board therefore wishes to encourage the community and all other stakeholders to pull together, and further demonstrate its significant capability and its positive contribution to the citizens of Europe and the world, particularly with a view to establishing a well-calibrated follow-on programme (working title: Key Digital Technologies, or "KDT") under the Horizon Europe scheme, that can help in the recovery process as well as establishing greater protection against future similar events.

During 2019, the ECSEL JU and its team continued to assure its activities and allowed a smooth, professional and efficient running of the Joint Undertaking: the handling of the calls and projects, the running of the newly integrated Finance and the Administration Units, monitoring and internal audit and the high-profile external Communications activities being the most important ones.

Three Calls for Proposals were launched in 2019 (RIA, IA and CSA), resulting in the selection of 14 collaborative projects: 8 Research and Innovation Actions and 6 Innovation Actions, as well as 1 Coordination and Support Action.

All together, they engage a total financial effort in excess of 660 M€, of which the EU contributes 172 M€ and the ECSEL Participating States 165 M€. Some 4 M€ additional funding is provided through the European structural funds. The remaining 320 M€ represents the in-kind contribution of private members and other beneficiaries.

All these figures prove the unique leverage effect of the Joint Undertaking. Grant Agreements for the 13 proposals selected from the Calls 2018 were signed and all projects have started their activities in 2019.

The three Lighthouse Initiatives - Mobility.E, Industry4.E and Health.E, set up to assure more critical mass and therefore concrete impact of the programme – continue to gain traction through their regular gatherings and discussions amongst project consortia, both inside and outside ECSEL and their related associations, and are now gradually showing results. The Governing Board looks forward to continuing to receive regular updates of their progress, particularly as this will become increasingly concrete in the coming period.

The Governing Board recognises once more that the important actions undertaken by the ECSEL JU in previous years, addressing the remarks of the European Court of Auditors and the Budgetary Authority, have been diligently pursued in order to obtain reasonable assurance on the legality and regularity of the underlying transactions. ECSEL Participating States have continued sending their declarations of assurance, which underpin the declaration of assurance of the Executive Director for the year 2019. The fruits of these actions are now clear, with the ECSEL JU being granted a clean opinion by the European Court of Auditors, for the year 2018.

The Governing Board acknowledges that the internal control system has been assessed to be appropriate and appreciates being regularly informed on developments and updates.

The Governing Board appreciates all efforts of the ECSEL JU Office to satisfy all stakeholders' requests in a positive, constructive and friendly way, and recognises the high workload handled by the team.

The Governing Board recognises that, according to the information provided in the Annual Activity Report, the Executive Director of the ECSEL JU has reasonable assurance that, overall, suitable controls are in place and are working as intended, risks are being properly monitored and mitigated, and necessary improvements detected by the auditors are being implemented. Therefore, the Executive Director, in his capacity as Authorising Officer, has signed the Declaration of Assurance without any reservation.

The Governing Board concludes that the Annual Activity Report for 2019 is adequate and correct and thanks the Executive Director and his entire team for contributing to the success of ECSEL JU.

For the Governing Board,
Dr. Sabine Herlitschka
Chairperson

Executive Summary

2019 was a year of reflection to prepare for the future. The impact study by Deloitte and VVA describes the ECSEL R&I ecosystem as characterised by inclusivity, a multi-sectorial approach, building win-win relations between industry and research organisations, being inclusive of SME's, promoting openness and knowledge sharing, trust and risk sharing, and bridging to other funding programmes in Europe with its Lighthouse Initiatives. For the interested reader, the full study can be found on the ECSEL JU website5.

On the operational side, the ECSEL JU concluded 12 contracts stemming from the two Calls in 2018, for a total cost of 798 M EUR, a total EU funding of 201 M EUR and a funding from the ECSEL Participating States of 195 M EUR. For the 3 Calls in 2019, there were 15 projects and activities selected out of the 40, high quality proposals received. From those 15 selected projects, 3 address the special (or priority) Call topics on edge computing and simulation of CAD. Concerning the evaluation process, the observers reported: "The overall quality of the evaluation process was very high. The way the process was conducted, including very detailed consensus meeting discussions, sub-panels for score calibration, cross-reading and final panel review, contributed to the fairness of the proposal assessment."

From the projects that finished in 2019, we can learn that the concept of distributed pilot-line or virtual clean room works well and thus avoids immense investments in new, state-of-the-art production facilities, and serves at the same time as an open platform for new technology development. Other projects demonstrated remarkable technology and efficiency progress in production equipment and metrology for semiconductor manufacturing. The CPS community scored high, with incremental and model-based approaches to assurance and certification of software-intensive critical systems. Other projects concluded on specific applications, such as imaging for health applications, LED design, IoT, validation of safety-critical systems and power electronics.

In 2019, the ECSEL JU signed the Administrative Agreement with Luxemburg, and is especially happy to observe that the new Participating States such as Switzerland, Turkey, Luxemburg, … all made an extra effort to catch up with the ECSEL JU community by organising information sessions, brokerage events, etc., inviting ECSEL JU staff to present. Through the Lighthouse Initiatives (Industry.E, Mobility.E & Health.E), the ECSEL community has continued to reach out to other communities, seeking wider cooperation and specific synergies. This has specifically helped to advance the joint activity with the IMI JU regarding the "Trials@Home" project: a special Call in the 2020 workplan for this was approved.

The Finance and Administrative team worked on the implementation of the H2020 payments and audit results, the closing of all FP7 projects, the improvement and upgrade of the IT infrastructure and the seamless paperless workflows. The BREXIT situation has been assessed several times and has/will have minimal impact on the ECSEL JU. All audit activities (IAS, ECoA, ex-post/CAS, IAC, …) were closely monitored, and due care and attention were given to proper reporting. High- and low-value procurements procedures, internal controls standards and (personal) data protection rules were closely followed.

From the communication side, ECSEL JU organized - for the third time in a row - a very successful 2-day symposium, this year in Bucharest, Romania, under the auspices of the EU presidency. Highlights also include a prominent participation at the annual EFECS event in Helsinki, the Brokerage event in Brussels, the DG-RTD "R&I Days" in Brussels, the ICT event, and many others. We initiated the "ECSEL impact visits" to showcase various projects in Austria and in the Netherlands, targeting mainly PAB delegates, and organised rencontres between our PAB delegates and the EU permanent representation delegates. The social media activities were reinforced with attractive publications and a specific "App" used at the symposium.

5 Part I. Activities and Achievements of the year

This section describes the activities of the ECSEL JU with reference to the Annual Work Plan for 2019. It covers the core activities of the JU (i.e. the operational aspects of making Calls for Proposals and the ensuing allocation of funding to projects), as well as the peripheral actions that are required for these to be most effective.

5.1 Objectives and associated risks

For 2019 the key objectives were:

- To run the calls 2019 within the set schedule without hiccups
- Select projects on innovative topics that complement the project portfolio while making efficient use of both National and EU funding and improving the 1:1 ratio between National funding and EU funding.
- Proceed with the Lighthouse Initiatives.
- Efficiently manage the ECSEL JU projects (amending the GA where needed, monitoring the progress, payment of the partners, etc) selected in the preceding calls while providing best service to the consortia.
- Implement the IT developments in SYGMA and COMPASS, the H2020 IT tools
- Promote ECSEL programme with the support of the ECSEL JU Communications unit, in particular in those countries that want to increase their efforts in ECSEL JU (Luxemburg, Switzerland, Turkey, Czech Republic).
- Provide adequate answers to the various audit services (IAS & ECA)
- Reporting to the EPS, Industry Associations and Boards.
- Prepare the activities for 2020.
- Prepare contingency plans for BREXIT

The identified risks for the operational unit can be summarized as follows:

- With the already gained experience on running Calls, the preparation, launch and execution of a call has become routine but nevertheless requires dedicated attention. One of the risks concerns the availability of the National budget figures of the EPS in-time. Another risk concerns unforeseen IT issues that could delay or hamper the call execution.
- Selecting the projects by the PAB is each year a difficult exercise, in view of the high quality of the proposals and the requirements regarding portfolio, the synergy with National strategies, the available National budgets and rules. Some of the main risks concern the lack of sufficient funding from the EPS, the mismatch for the selected projects between National and EU funding, and the quality of the expert evaluation.
- The workings of Lighthouse Initiatives and the LIASE is still uncharted territory and requires extra attention to get to an efficient organization. The risk on those activities pertained to possible loss of momentum and/or credibility.
- An efficient management of the projects requires software tools that work without failure and are adapted to the special needs of ECSEL JU. In addition, enough time is required to execute the required administration. The main risks therefore pertain to the tools and to the time constraints.
- In 2019 the projects of Call 2014 had to be closed, technically and financially (different workflows, new procedures such as guarantee fund, etc.). As a risk this could lead to unforeseen issues, that especially in the final phase of a project could be challenging.

As will be discussed further, the operational objectives for 2019 were all achieved.

5 .2 Research & Innovation activities

The WP2019 describes the topics (based on the MASP), the schedule, the evaluation and selection procedure, the budgets (both EU and National), the National rules applicable for the National grants, and the H2020 appendices applicable to the IA (ECSEL Call 2019-1) and RIA (ECSEL Call 2019-2) calls. The RIA call had two special topics. A small CSA call to support the Health.E lighthouse was also launched. The Call coordinator also prepared an Applicants Guide (ED decision) for those Calls that contains further relevant information, in particular on those points that are different from the general H2020 procedure. The ECSEL JU Governing Board (GB) also decided to appoint two independent observers to assess the evaluation procedure. In their report to the GB they state:

"The overall quality of the evaluation process was very high. The way the process was conducted, including very detailed consensus meeting discussions, sub-panels for score calibration, cross-reading and final panel review, contributed to the fairness of the proposal assessment."

The office took into account the recommendations of the Observer of the preceding evaluations in as far as this was possible. The work plan also encourages the consortia to achieve a proper 1.2 to 1 ratio between National funding and EU funding at proposal level. This has helped in the last years to get close to the 1:1 at grant signature.

Thanks to the efforts of the Call coordinator the calls 2019 submission, evaluation and selection ran smoothly.

Two Lighthouse Initiatives are running since mid-2017 and third was selected in 2018. The GB decided to support the Lighthouse Initiatives through CSAs (Coordination and Support Actions). Two CSAs were selected in 2018 and one in 2019. Lighthouse initiatives are evolving slowly but surely towards becoming bridges between communities and between programmes as originally envisioned.

The Strategic Research Agenda (SRA) for the ECS community is adapted each year and identifies ten areas. It also is the Agenda for some EUREKA clusters such as PENTA and since 2019 EURIPIDES2.

The SRA served as basis for the MASRIA 2019. The Commission provided guidance by virtue of its statutory duty to "seek to ensure coordination between the activities of the ECSEL Joint Undertaking and the relevant activities of Horizon 2020 with a view to promoting synergies when identifying priorities covered by collaborative research" (Art. 7.2 of the Statutes attached to the REGULATION).

The Executive Director consolidated the MASP2019. The MASP2019 identifies five application areas and five essential capabilities that defines the topics for the Work Plan (WP) 2019 on which the Calls 2019 are based. The Governing Board adopted both MASP2019 (ECSEL GB 2019.134) and WP2019 (ECSEL GB 2019.132).

In support to the priorities identified by the Mobility.E-LIASE, advising the GB, a special topic on ARCHITECTURES, COMPONENTS, AND SYSTEMS FOR VALIDATION/SIMULATION OF CONNECTED AUTOMATED VEHICLES was included in the RIA Call. The GB also adopted a second special topic on EDGE COMPUTING on proposal of the European Commission.

5 .3 Calls for proposals and grant information

5.3.1 Call 2019: organisation, conditions

The ECSEL JU launched three calls for proposals: 2019- 1 inviting Innovation Actions and 2019-2 for Research and Innovation Actions and 2019-3 inviting for a Coordination Support Action. The first two calls had two phases. They ran in parallel, following the same schedule (Table 1):

Activity	Date
Calls launching	6 February 2019
Project Outline deadline	7 May April 2019, 17:00:00 Brussels time
Full Project Proposal deadline	18 September 2019, 17:00:00 Brussels time
Evaluation and selection	25 November 2019
Grant agreement, project start	May 2020

Table 1: Call schedules

The decisions for the selection of projects are PAB-2019.4 and PAB-2019.47, signed on 27 November 2019.

The CSA Call 2019-3 was a single phase. This call was launched on 5 March 2019. The FPP deadline was 27 March 2019, and the selection decision PAB-2019.44 was signed on 15 May 2019. The grant was signed on 29 July 2019.

The different periods for the execution of the procedures are as follows (Table 2):

	Launch to Decision	Launch to FPP submission deadline	FPP submission deadline to Decision
2014	162	70	92
2015	246	175	71
2016	240	189	51
2017	266	211	55
2018	266	211	55
2019	292	224	68

Table 2: Timing of the different submission steps (days)

The calls 2019 ran according to schedule. The EU funding rates, to be calculated based on the costs according to H2020 rules, remained the same for a fourth year on a row[5] (Table 3).

	RIA			IA		
	LE	SME	Other	LE	SME	Other
2014	50%	50%	50%	25%	35%	50%
2015	25%	30%	40%	15%	25%	40%
2016	25%	30%	35%	20%	25%	35%
2017	25%	30%	35%	20%	25%	35%
2018	25%	30%	35%	20%	25%	35%
2019	25%	30%	35%	20%	25%	35%

Table 3: EU reimbursement rates

For the CSA call 2019-3 the EU funding rates were 100%.

The split in the announced EU estimated expenditure between RIA and IA is as follows (Table 4):

	RIA in M€	IA in M€	Total in M€
2014	40	115	155
2015	50	95	145
2016	65	85	150
2017	67.5	92.5	160
2018	63.35	110	173.35
2019	80.8[6]	92.5	173.3[7]

Table 4: EU estimated expenditure in M€

5 "LE" stands for "Large Enterprise" and are all for profit organizations that are not SME; "Other" includes all types of not for profit organizations such as Research Institutes, Public entities, Universities, etc.

6 Including 5M€ for special topic 1 and 10M€ for special topic 2

7 Not including 0.5M€ for CSA Call 2019-3 and 0.4M€ for procurement

5.3.2 Call 2019: results and comparison to previous calls

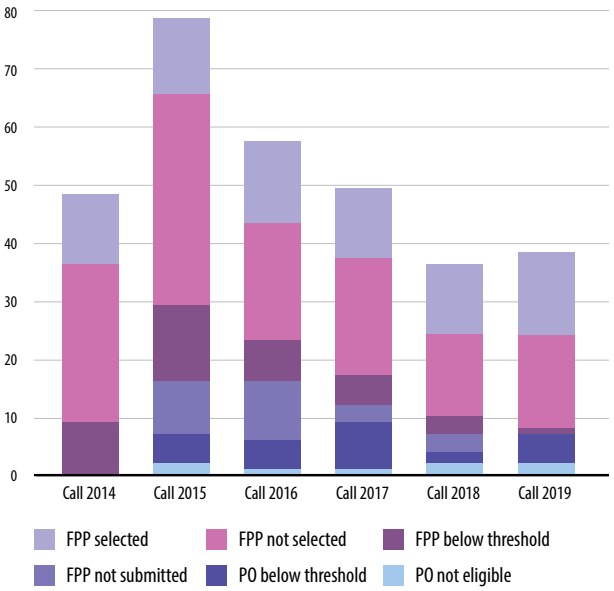


Figure 1: Project submission and selection statistics (this figure does not include the CSA call in 2019).

27 proposals were submitted at PO phase in the RIA call 2019, out of which 8 were selected[8]. One of those proposals was submitted under "SPECIAL TOPIC 1: ARCHITECTURES, COMPONENTS, AND SYSTEMS FOR VALIDATION/SIMULATION OF CONNECTED AUTOMATED VEHICLES" and was selected and two proposals were submitted under "SPECIAL TOPIC 2: EDGE COMPUTING" and both were selected.

In the IA call 2019, 11 proposals were submitted at PO Phase and 6 were selected. This brings the totals for the 5 years to: 42 selected RIA proposals and 35 selected IA proposals, a total of 77 projects.

For the CSA call, 1 project was submitted and after evaluation by experts was selected by the PAB.

The number of proposals was slightly higher than in 2018, the number of selected proposals is also higher. In this context it is interesting to look at the resubmission proportion[9] for the calls, the below threshold proportion[10] and the proportion of selected resubmitted[11].

	Resubmission %	Below threshold %	Resubmitted selected %
2015	22%	37%	na
2016	18%	35%	21%
2017	15%	41%	25%
2018	21%	15%	8%
2019	21%	20%	14%

Table 5: Resubmissions and threshold

The figures of Table 5 seem to confirm a learning effect. The identification by the community of proposals that will be submitted to ECSEL seems to take place "upstream" and is focussed on high-value proposals. This is confirmed by the smaller proportion of below threshold, it should be noted that the threshold level was raised in the call 2017 and still the number of proposals below threshold dropped. The number of selected resubmitted proposals also dropped in the last two years indicating that good proposals were selected without the need for resubmission. A further indication for higher quality will be discussed below when assessing the score distribution. This improved quality effect also influences the success rate[12] as shown in the next figure.

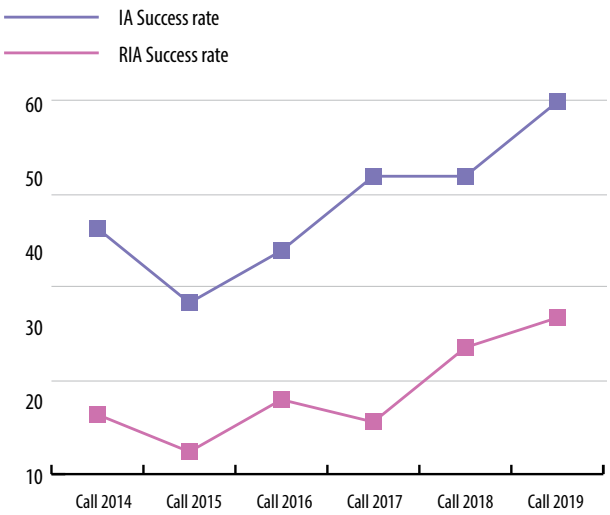


Figure 2: Success rate for proposals.

8 Here as well as in the rest of the document we will include the project ANDANTE in the figures. ANDANTE was on the reserve list at the moment of the selection but was included as selected project in the PAB of 16 January 2020. Therefore, for the coherence of the figures it seemed advisable to include this project in the figures for the Call 2019.

9 Number of declared resubmitted proposals at PO phase versus total number of eligible submitted proposals at PO. Resubmission meaning that the proposal was submitted in a previous H2020 call, not necessarily an ECSEL call. Most resubmitted projects though had been submitted under a previous ECSEL call.

10 Number of below thresholds (at PO and FPP) proposals versus total number of eligible submitted proposals at PO.

11 Selected resubmitted proposals by selected proposals.

12 The success rate is defined here as the ratio between selected proposals to submitted proposals at the earliest stage (PO or FPP depending).

Evolution of cost and requested funding in proposals submitted FPP

The amounts involved at the FPP stage (i.e. at submission so prior to selection) are summarized in Table 6 as well as a comparison with previous year's FPP figures.

in M€	Number of proposals	Total H2020 cost	Requested EU funding	Total National cost	Requested National funding
RIA 2014	34	791.1	394.1	907.9	245.4
IA 2014	14	1039.5	321.4	1287.2	231.6
Total 2014	48	1830.5	715.5	2195.1	476.9
RIA 2015 FPP	51	962.9	294.4	1060.0	284.1
IA 2015 FPP	11	833.6	175.3	869.3	196.2
Total 2015 FPP	62	1796.5	469.7	1929.3	480.2
RIA 2016 FPP	28	605.1	176.6	653.0	175.9
IA 2016 FPP	13	1232.2	280.8	1340.2	269.7
Total 2016 FPP	41	1837.3	457.3	1993.2	445.5
RIA 2017 FPP	26	567.1	165.6	624.2	178.5
IA 2017 FPP	11	660.2	157.6	721.4	158.3
Total 2017 FPP	37	1227.3	323.2	1345.6	336.8
RIA 2018 FPP[13]	18	500.6	147.1	550.0	150.7
IA 2018 FPP[14]	9	866.8	208.5	963.1	208.5[15]
Total 2018 FPP	27	1367.3	355.6	1513.1	402.8
RIA 2019 FPP[16]	21	500.3	145.8	541.9	153.3
IA 2019 FPP	10	708.1	172.2	797.4	196.3
Total 2019 FPP	31	1208.4	318.0	1339.4	349.7

Table 6: Overview of proposals submitted at the FPP stage.

13 Including the special topic proposal
14 Including the TEMPO proposal
15 One proposal introduced wrong figures (typo) for the requested National funding, a corrected figure is used.
16 Including the proposals submitted to the special topics

On average the projects are smaller in budget than in the last two years, but the total number of participants is higher than in the last two years. So, more participants but smaller budget.

Figure 3 compares some of the ratios between the amounts in the Table 6 above, assuming an amount for the requested National funding equal to the requested EU funding.

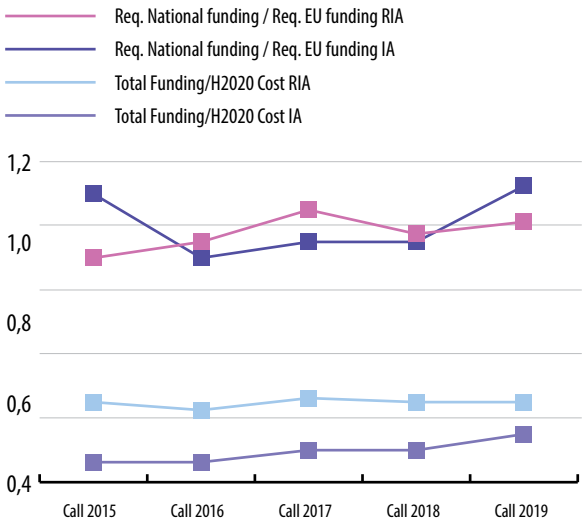


Figure 3: Requested total funding percentage and National over EU funding ratio

Overall the total funding rates calculated as the total requested funding (National + EU) compared to the H2020 total cost is constant for the RIAs but slightly increasing for the IAs. The ESIF funding has not been considered; this would increase the funding rates with a few percentages.

The evolution of the ratio of requested National funding over the requested EU funding (National to EU funding ratio) is important to follow in view of the ECSEL JU council regulation. Both for RIA and IA, this ratio is larger than 1 in 2019, denoting a serious effort by the consortia to reach the 1.2:1 ratio in the Work Plan 2019. In the next chapter we will discuss the selected projects and the resulting ratio.

Regarding oversubscription, the national committed funding announced before the deadline always matches closely the announced EU commitment amount (last column in Table 7)

Year of call	EU Oversubscription	National oversubscription	Nat/EU commitment ratio
2014	4.62	3.04	1.01
2015	3.24	3.32	0.92
2016	3.05	2.93	1.02
2017	2.00	1.89	1.12
2018	2.05	2.06	1.13
2019	2.02	1.85	0.99

Table 7: Oversubscription and total commitments

Evolution of number of participants and entities

Table 8 shows entities, participations, and the % of New and Return entities.

	2014	2015	2016	2017	2018	2019	ALL YEARS
Total entities	849	971	841	700	732	**754**	2681[17]
Participations	1393	1564	1332	1092	1089	**1138**	7608
Participations/ Entity	1.64	1.61	1.58	1.56	1.49	**1.51**	2.84
%Return entities	46%	52%	61%	58%	58%	**57%**	31%
%New entities	54%	48%	39%	42%	42%	**43%**	79%

Table 8: Various figures relating to participations and entities

New entities are entities that did not participate in the three preceding years. For 2014, 2015 and 2016 the list of participants to ENIAC and ARTEMIS calls were used. The Return entities are entities that did participate in one of the three previous years.

Overall 79% of the entities are new to ECSEL, in other words they did not participate in the previous FP7 calls. Of those new entities 33% participated more than one time in ECSEL proposals. The average number of participations for those new entities is 1.5. Out of those "new" entities 74 have participated 4 or more in the 6 years of the ECSEL programme. This should be compared with the 21% of entities that are not new to ECSEL and so participated in FP7 calls, for those entities the average number of participations is 3.2. Out of those "historical" entities 220 have participated 4 or more in the 6 years of the ECSEL programme and this should be compared to the previous 74.

If one identifies the core of the ECSEL participants as those entities that participated 4 or more times, then this core corresponds to 294 organizations or 12% of the entities that participated in ECSEL. Those figures tend to indicate that ECSEL is not a closed club but on the contrary attracts a broad participation of organizations that participate a few times with 12% of the organizations participating more often. Those last organizations are mostly "historical" in the sense that they already participated in previous ENIAC and ARTEMIS programmes, but a healthy 74 "new" companies have joined them to form the core.

Table 9 gives the percentages per type for entities (numbers in parentheses) and participations for the 6 years of ECSEL, the proportions over the last 4 years stayed fairly constant.

	Entities	Participation
SME	38% (2019)	27%
LE	39% (1046)	36%
OTHER	23% (616)	37%

Table 9: Various figures relating to participations

17 The sum total number of entities participating is not equal to the sum over the years as one entity can participate in different years.

Evolution of nationality of participants

The calls 2019 had participants from 31 countries: all EU countries except Estonia, Luxembourg and Malta, as well as participants from (in brackets number of participations): Canada (1), Israel (19), Norway (11), Switzerland (26), Taiwan (2), Turkey (57) and USA (1). This year the strong participation of Turkey in the calls 2019 is noteworthy.

Over the six years that ECSEL is running, organisations of 35 countries have participated at least once: all EU countries (except Malta and Estonia) and Brazil, Canada, Israel, Norway, Serbia, Switzerland, Russia, Taiwan, Tunisia, Turkey and USA.

Coverage of topics by submitted proposals

All topics defined in the WP2019 were open for proposals. Two special topics were included, and the work plan mentioned several encouragements for proposals on Safety, Security and Reliability; Computing and Storage; Health and Well-Being and Digital Life. The work plan also encourages proposals that cut across disciplines, support platform building, interoperability, establishment of open standards. Aspects of value chain integration are important to the ECSEL programme and consortia are also encouraged to submit proposals that take this into account.

The RIA call contained two special topics:

- A first topic concerns: ARCHITECTURES, COMPONENTS, AND SYSTEMS FOR VALIDATION/SIMULATION OF CONNECTED AUTOMATED VEHICLES. This topic was proposed by the MOBILITY.E lighthouse initiative as a priority. It covers the improvement of the robustness and quality assurance for safety validation of connected automated road vehicles. The central issue is the identification of the failure risk for each part in the ECS value chain.
- A second topic concerns: EDGE COMPUTING. With the advent of the internet of things and the inclusion of artificial intelligence (machine learning) applications in mobile applications it becomes essential to develop complex computing systems at the edge of the network, in particular their scalability, power efficiency, reliability, security and performance.

The 31 proposals submitted to the calls 2019 (FPP) reflected those concerns and covered the different topics as Table 10 shows.

TECHNOLOGY	
Systems and components	30%
Connectivity and interoperability	7%
Safety, security and reliability	29%
Computing and storage	8%
Electronic components process technology, equipment, materials and manufacturing	26%
APPLICATIONS	
Transport and smart mobility	29%
Health and well being	20%
Energy	18%
Digital industry	21%
Digital life	12%

Table 10: Percentages of self-declared activity by cost of projects

5.3.2.1 Results of the calls after selection

Evolution of costs and funding for the selected projects

The amounts for the **selected** projects after the PAB decision are given in the following table. The beneficiary contribution is calculated as: "Total H2020 cost minus the requested EU funding minus the requested National funding minus the ESI funding".

	Selected projects	Partners	Total H2020 cost M€	Requested EU funding M€	Total national cost M€	Requested national funding M€	Requested ESIF M€	Beneficiary Contribution M€
RIA 2014-1	6	162	140.7	47.5	140.7	38.0	0.0	55.2
IA 2014-2	6	175	463.5	101.8	499.5	90.0	0.0	271.8
Total 2014	**12**	**337**	**604.2**	**149.2**	**640.2**	**128.0**	**0.0**	**327.0**
RIA 2015-1	8	163	168.7	51.7	181.8	39.1	0.0	77.9
IA 2015-2	5	193	421.9	90.6	459.9	87.2	0.0	244.2
Total 2015	**13**	**356**	**590.6**	**142.2**	**641.7**	**126.3**	**0.0**	**322.2**
RIA 2016-1	8	243	216.3	60.5	196.6	47.8	9.0	99.0
IA 2016-2	6	268	503.1	103.0	455.2	85.9	1.6	312.6
Total 2016	**14**	**511**	**719.4**	**163.5**	**651.8**	**133.8**	**10.6**	**411.6**
RIA 2017-2	6	267	215.0	62.6	238.1	53.7	2.3	96.5
IA 2017-1	6	182	458.7	109.4	500.0	106.4	3.7	239.3
Total 2017	**12**	**449**	**673.7**	**171.9**	**738.1**	**160.1**	**5.9**	**335.7**
RIA 2018-2	6	206	211.6	62.2	234.5	53.6	2.1	95.8
IA 2018-1	7	302	586.2	138.8	634.4	141.1	3.3	306.3
Total 2018	**13**	**508**	**797.8**	**201.0**	**868.9**	**194.7**	**5.4**	**402.1**
RIA 2019-2	8 [18]	266	204.7	60.2	216.9	59.4	0.0	85.1
IA 2019-1	6	313	454.8	111.4	485.0	105.4	3.9	238.0
Total 2019	**14**	**579**	**659.5**	**171.6**	**701.8**	**164.8**	**3.9**	**319.3**
TOTAL	**78**	**2740**	**4045.3**	**999.4**	**4242.6**	**907.6**	**25.8**	**2117.9**

Table 10: Cost and Funding for selected projects

The figures for 2019 are not final, nevertheless they form a first basis for comparison. A comparison with previous 3 years shows similarities. The calls 2019 delivered more projects and more partners than in previous years.

The total achieved leverage for the ECSEL JU programme calculated as the H2020 cost minus EU funding divided by the EU funding equals 3, meaning for each Euro H2020 funding 3 Euros are leveraged from other funding agencies or private participants investment. One Euro of H2020 funding also leverages 0.93 Euro of national and/or ESIF funding.

18 Includes the project ANDANTE that was on the reserve list and was selected on 16 January 2020 by the PAB

Evolution of several performance indicators for selected projects

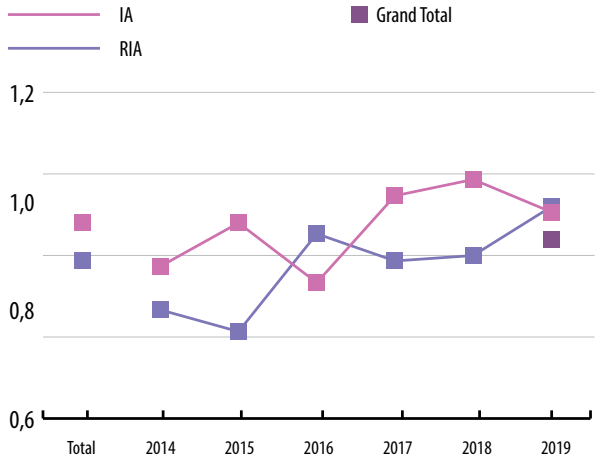


Figure 4: National over EU funding ratio of selected projects

The national to EU funding ratio (NER) is calculated as the ratio of national funding and ESIF[19] over EU funding in Figure 4. This should be compared to Figure 3. The ratios for the selected projects show more fluctuations per call and are overall lower, but in the three last years, one sees an improvement. This corresponds to the inclusion in the work plan of an encouragement to the consortia to prepare proposals with a national funding to EU funding larger than 1. The fluctuations in figure 4 are explained by the exhaustion of national funding for some of the partners in selected projects. Those partners do keep the EU funding skewing the national to EU funding ratio. Logically the lower the EU funding rate the higher the ratio as demonstrated in this figure. Smaller RIA projects might help to improve this ratio but at the cost of a lower impact. For 2019 the funding figures are not final and improvement in the national to EU funding ratio is expected. For the years 2014 to 2019 the NER equals 0.93.

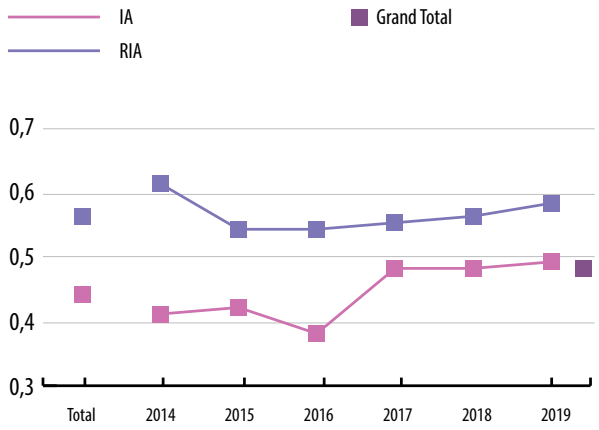


Figure 5: Total Funding (National funding and EU funding and ESIF funding over H2020 cost) in selected projects

Figure 5 shows that the evolution of the total funding[20] rate is stable in the last years, a slight increase in the average RIA funding ratio could indicate a higher participation of not for profit organizations (OTHER).

Figure 6 shows the evolution of the partner types in the selected projects. For 2019 the figures are not final. More SMEs participated in the RIA call at the expense of the Large Enterprises and this might explain the increase in total funding in 2019.

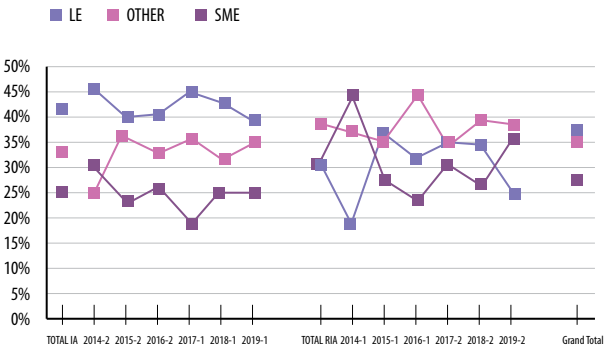


Figure 6: Participation ratio per type of participant in selected projects

Figure 7 shows the average success per partner rate, calculated as the ratio of entities of a type in selected projects to the same entities in the submitted projects (at FPP) and compare this with the success rate of the projects.

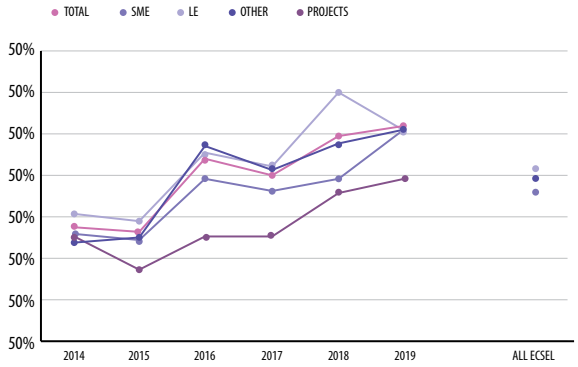


Figure 7: Success per type of participant

The surprising conclusion for figure 7 is that the success rate for the participants is higher than for the projects. This can be explained by the multiple participations (one entity participating in different projects, some are selected some are not). We already explained the positive trend as a learning effect, it appears that at the level of the organizations this learning effect is also present more strongly in the large enterprises and weaker in the SMEs though the SMEs seem to catch up.

19 ESIF is included on the National side as it can be considered state aid in the same way as other forms of National funding

20 Sum of fundings (national, EU, ESIF) divided by H2020 cost

The person-months versus cost per call features some peculiarities (Table 12).

Call	Total Cost (MEuro)	Number of beneficiaries	Person-months (PM)	Number of projects	PM per project	PM per partner	Cost (Euro) per PM
2014-1-RIA	141	162	13,982	6	2330	86	10,060
2015-1-RIA	169	163	14,546	8	1818	89	11,598
2016-1-RIA	216	243	24,427	8	3053	101	8,854
2017-2-RIA	215	267	23,166	6	3861	87	9,281
2018-2-RIA	212	206	19,025	6	3171	92	11,121
2019-2-RIA	205	271	18,233	8	2279	67	11,230
2014-2-IA	464	175	34,753	6	5792	199	13,338
2015-2-IA	422	193	35,974	5	7195	186	11,729
2016-2-IA	503	268	37,226	6	6204	139	13,516
2017-1-IA	459	182	35,462	6	5910	195	12,934
2018-1-IA	586	302	50,483	7	7212	167	11,612
2019-1-IA	454	317	37,926	6	6321	120	11,972
ALL	4,045	2,749	345,203	78	4426	126	11,716

Table 12: Person-months statistics

The 78 selected projects represent 28767 person-years. The cost per person-month was fairly stable in the last years, around 11,700€ per person-month. What changes from one call to another is the average involvement per partner in terms of person-months. The call 2019-2-RIA has the lowest number of person-months per partner, 67 person-months. In the Figure 8 one notices a general slightly sublinear trend. Some projects are well below this trendline and therefore have high cost compared to lower person months. Those are in general capital-intensive projects with a proportion of personnel cost of around 50% of the total H2020 cost, while projects on the trendline have a proportion of 65%. Some go even higher like Produktive 4.0. Those are typically larger platform projects.

5.3.3 Support per category of partner, in particular SMEs

ECSEL JU recognises three categories of partners: Large Enterprises (for profit and not SME), Small and Medium Enterprises (according to the definition of H2020) and Other (not for profit organisations). As funding rates are different for those three categories it is important to verify the proper attribution for each partner. This is done by REA at the Grant Preparation stage. Therefore, for the selected projects of call 2019 some attributions might still be erroneous and are pending verification. In previous paragraphs the participation of the three different types of organizations was discussed at length.

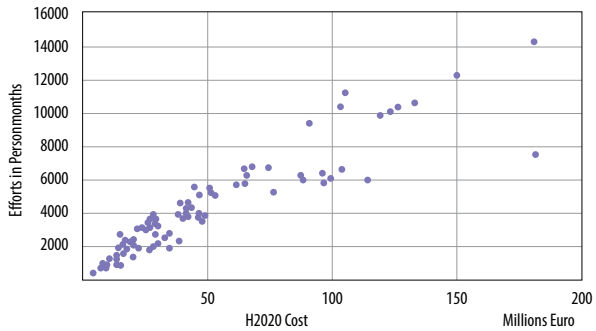


Figure 8: Cost vs effort for the selected projects

5.3.4 Portfolio analysis

The selected 14 projects cover and complement the existing project portfolio (Table 13).

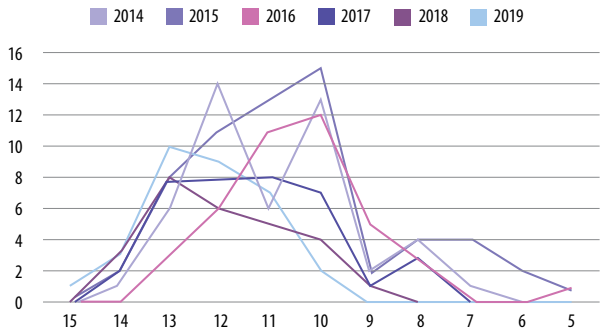
Call	Proposal	Objective	CC
2019-1-IA	iRel40	Improving reliability for electronic components and systems by reducing failure rates along the entire value chain	AT
2019-1-IA	InSecTT	will provide intelligent, secure and trustworthy, explainable systems for industrial applications to provide comprehensive cost-efficient solutions of intelligent, end-to-end secure, trustworthy connectivity and interoperability and bringing Internet of Things and Artificial Intelligence together.	AT
2019-1-IA	IT2	explore, develop and demonstrate technology options that are needed to realize 2nm CMOS logic technology extending the scaled Semiconductor technology roadmap to the next node in accordance to Moore's law	NL
2019-1-IA	Moore4Medical	accelerate innovation in electronic medical devices for emerging medical applications that offer significant new opportunities for the ECS industry	NL
2019-1-IA	CHARM	contribute to develop ECS technologies that tolerate harsh industrial environments	FI
2019-1-IA	BEYOND5	build a completely European supply chain for Radio-Frequency Electronics enabling new RF domains for sensing, communication, 5G radio infrastructure and beyond	FR
2019-2-RIA	Progressus	next generation smart grid, demonstrated by the application example "smart charging infrastructure" that integrates seamlessly into the already existing concepts of smart-grid architectures keeping additional investments minimal	DE
2019-2-RIA	NextPerception	bringing perception sensing technologies like Radar, LiDAR and Time of Flight cameras to the next level, enhancing their features to allow for more accurate detection of human behaviour and physiological parameters	FI
2019-2-RIA	ADACORSA	strengthen the European drone industry and increase public and regulatory acceptance of BVLOS (beyond visual line-of-sight) drones, by demonstrating technologies for safe, reliable and secure drone operation in all situations and flight phases	DE
2019-2-RIA	VALU3S	design, implement and evaluate state-of-the-art Verification & Validation methods and tools in order to reduce the time and cost needed to verify and validate automated systems with respect to safety, cybersecurity and privacy (SCP) requirements	SE
2019-2-RIA	ANDANTE	leverage innovative hardware platforms to build strong hardware / software platforms for artificial neural networks (ANN) and spiking neural networks (SNN) as a basis for future products in the Edge IoT domain, combining extreme power efficiency with robust neuromorphic computing capabilities	FR
2019-2-RIA-SP1	ArchitectECA2030	robust mission-validated traceable design of electronic components and systems (ECS), the quantification of an accepted residual risk of ECS for ECA vehicles to enable type approval, and an increased end-user acceptance due to more reliable and robust ECS	DE
2019-2-RIA-SP2	FRACTAL	create a reliable computing node that will create a Cognitive Edge under industry standards that will be the building block of the scalable Internet of Things (from Low Computing to High Computing Edge Nodes)	ES
2019-2-RIA-SP2	BRAINE	boost the development of the Edge framework focusing on energy efficient hardware and AI empowered software, capable of processing Big Data at the Edge, supporting security, data privacy, and sovereignty	IT

Table 13: Selected projects from the calls 2019 (RIA and IA) with Country of Coordinator (CC)

5.3.5 Evaluation results

Figure 9 is a histogram of the weighted and normalised scores (both RIA and IA) per year.
One can indeed see a trend towards higher scores and less broad distributions.

Figure 9: Scores at evaluation, histogram



5.4 Progress against KPIs / Statistics

KPIs are presented in Annex I; this chapter contains the narrative. The subsequent topics are non-call related.

5.4.1 Grant Agreement Preparation to signature for projects selected in call 2018

The ECSEL decisions PAB-2019.42 and PAB-2019.43 on the amendment of the selection of projects from the Call 2018 were taken on 6 May 2019.

The Grant Agreement of 13 projects were signed from submission (FPP deadline 20 September 2018) to signature on average in 242 days within the 8-month deadline, with one exception the CPS4EU was signed after 285 days. This is due to the late decision of the PAB to select this project (decision ECSEL PAB-2019.43 signed 6 May 2019).

5.4.2 Size of projects

Table 14 compares average values for projects in the different calls.

	Average number of beneficiaries	Average cost per project M(€)	Average EU Funding per project M(€)	Average National Funding per project M(€)
RIA 2014-1	27	23.4	7.9	6.3
IA 2014-2	29	77.3	17.0	15.0
Total 2014	**28**	**50.4**	**12.4**	**10.7**
RIA 2015-1	20	21.1	6.5	4.9
IA 2015-2	39	84.4	18.1	17.4
Total 2015	**27**	**45.4**	**10.9**	**9.7**
RIA 2016-1	30	27.0	7.6	6.0
IA 2016-2	45	83.9	17.2	14.3
Total 2016	**37**	**51.4**	**11.7**	**9.6**
RIA 2017-2	45	35.8	10.4	9.0
IA 2017-1	30	76.4	18.2	17.7
Total 2017	**37**	**56.1**	**14.3**	**13.3**
RIA 2018-2	34	35.3	10.4	8.9
IA 2018-1	50	97.7	23.1	23.5
Total 2018	**42**	**66.5**	**16.7**	**16.2**
RIA 2019-2	34	25.6	7.5	7.4
IA 2019-1	53	75.8	18.6	17.6
Total 2019	**42**	**47.1**	**12.3**	**11.8**
TOTAL	**36**	**52.5**	**13.0**	**11.8**

Table 14: Average beneficiaries, cost and funding per (selected) project

As was already pointed out, the selected projects for the calls 2019 have a bit more participants than average, reducing cost and funding per participants.

5.5 Evaluation: procedures and global evaluation outcome, redress, statistics

The rules for evaluation and selection are based on the H2020 general rules, and the specific provisions required by the ECSEL setup have been established and then reviewed by the decision PAB-2018.31 valid for the calls 2019. The experts to be assigned must be registered in the H2020 expert database. Table 15 shows the number of experts as a function of the submitted proposals. In 2019, 3 experts were appointed for each PO phase. Extra efforts were put into selecting experts with the right expertise. The assignment procedure considered the area of expertise, and finally, the absence of conflicts of interests.

	PO 2017	FPP 2017	PO 2018	FPP 2018	PO 2019	FPP 2019	CSA 2018	CSA 2019
Proposals to be evaluated	49	37	34	27	37	31	2	1
Experts appointed	59	38	46	32	46	36	6	4

Table 15: Evaluations and experts

Table 16 provides a gender-based overview. For the CSA 2018, 6 experts (2 female and 4 male) were selected as well as 2 experts (2 female) in the role of observer for the evaluations. An extra effort was made to attract female experts. The relative proportion of female experts was appreciably increased.

Gender of experts	PO 2016	FPP 2016	PO 2017	FPP 2017	PO 2018	FPP 2018	PO 2019	FPP 2019
Male	53	38	44	29	32	23	26	21
Female	9	6	15	9	14	9	20	15
Total	62	44	59	38	46	32	46	36
% Female	15%	14%	25.4%	23.7%	30%	28%	43.5%	41.7%

Table 16: Gender of experts for evaluation of calls

Table 17 provides a country-of-origin based breakdown:

Country of residence	PO 2017	FPP 2017	PO 2018	FPP 2018	PO 2019	FPP 2019	CSA 2018	CSA 2019
AT	3	2	1	1	1	1	0	0
BE	2	1	2	1	2	2	0	0
BG	3	2	3	2	2	2	0	0
CY	1	0	1	0	0	0	0	0
CZ	4	2	0	0	0	0	0	0
DE	12	7	7	4	9	7	2	0
DK	0	0	2	2	1	1	1	1
EL	1	2	2	1	1	1	1	0
ES	6	3	5	4	6	4	1	1
FI	0	0	0	0	1	1	0	0
FR	4	4	4	3	5	4	0	0
HU	2	4	0	0	0	0	0	0
IE	0	0	2	2	3	2	0	0
IL	1	0	2	2	1	1	0	0
IT	4	4	4	3	4	3	0	0
NL	2	1	2	0	2	2	0	0
NO	0	0	0	0	1	0	0	0
PL	2	2	3	2	3	3	0	0
PT	2	1	1	1	1	0	0	0
RO	2	1	1	1	1	0	0	0
SE	3	1	2	1	2	2	0	1
TR	0	0	1	1	0	0	0	0
UK	3	2	1	1	0	0	1	1

Table 17: Nationality of experts

Finally, Table 18 provides the breakdown according to the affiliation of the expert:

Affiliation	PO 2016	FPP 2016	PO 2017	FPP 2017	PO 2018	FPP 2018	PO 2019	FPP 2019	CSA 2018	CSA 2019
Private	32	24	31	19	26	17	25	21	4	4
Public	23	14	22	14	17	13	19	13	1	0
Independent	7	6	6	5	3	2	2	2	1	0

Table 18: Affiliation of experts

An extra effort was made to attract new experts, 16 new experts participated in the evaluations in 2019 as compared to 12 in 2018. This represents 34.8% (as compared to 26% in 2018) of the total. New experts are experts that did not participate to any of the ECSEL call evaluation exercises in 2016, 2017 and 2018.

ECSEL is a LEIT programme and the proposals are oriented towards industrial topics, which explain the relatively high participation of experts from the industry. Of course, the rules for the conflict of interest are applied and during the evaluation procedure several checks are being performed at each stage of the procedure.

5.6 Call for tenders

The work plan 2019 foresaw to carry out by public procurement a study on subjects of a strategic nature for the ECSEL JU, supporting more specifically the ECS technology impact on societal and economic parameters over time. The objective of this study was the assessment of the impact of ECSEL JU funded actions since its creation in 2014, taking into account the legacy of ENIAC and ARTEMIS Joint Undertakings from the previous Framework Programme (FP7), providing evidence of what ECSEL has contributed to, what it has allowed to emerge or develop, what industrial take-up it has initiated, what impact it has had regarding national priorities and funding, how SMEs have benefited from the funding, but also identifying and measuring the leverage, the return on investment of funded projects within the ECS community and society at large.

The contract was awarded to Deloitte Consulting and Valdani Vicari a Associati (VVA) to run from May till December 2019. The output report was presented and shared with the GB. Further communication sessions involving ECSEL stakeholders are foreseen during 2020.

5.7 Dissemination and information about projects' results

5.7.1 Monitoring

In total 43 reviews were organised (each with 2 external experts), out of which 3 were interim reviews organised to redress situations discovered during an official review or to cover a project extension leaving 40 official reviews. The size of the pool of experts used in the reviews as a function of the number of organised reviews is shown in Table 19. Each expert can participate in one or several reviews, in 2019, 96 appointment letters for review experts were signed.

	Reviews 2014	Reviews 2015	Reviews 2016	Reviews 2017	Reviews 2018	Reviews 2019
Reviews organised[21]	64	59	55	49	48	43
Experts	74	54	60	58	56	25

Table 19: Reviews and experts

Table 20 provides a gender-based overview. The decreasing number of female experts for reviews will be improved through the higher proportion of female experts in the evaluation which then will be appointed for reviews in the coming years.

Gender of experts	Reviews 2014	Reviews 2015	Reviews 2016	Reviews 2017	Reviews 2018	Reviews 2019
Male	62	47	55	55	51	47
Female	12	7	5	3	5	5
Total	74	54	60	58	56	52
% Female	16%	13%	8.3%	5.2%	8.93%	9.6%

Table 20: Gender of experts for reviews

Table 21 provides the country-of-origin based breakdown:

	Review 2014	Review 2015	Review 2016	Review 2017	Review 2018	Review 2019
AT	3	3	3	3	3	3
BE	1	1	1	1	2	2
BG	0	0	1	2	1	2
CH	1	2	0	1	0	0
DE	14	8	14	12	17	13
DK	1	2	1	2	2	3
EL	4	5	4	3	1	1
ES	4	3	4	3	4	5
FI	1	1	1	0	0	0
FR	12	10	8	12	8	8
HU	0	0	0	0	0	1
IE	4	2	2	2	2	1
IT	6	4	6	5	4	3
LU	0	0	1	0	0	0
NL	5	4	4	5	3	1
NO	1	1	1	0	0	0
PL	0	0	1	0	2	2
PT	1	0	3	0	0	0
RO	2	1	1	0	1	1
SE	5	4	0	1	2	2
UK	7	3	4	5	4	4

Table 21: Country of origin of experts for reviews

21 The figures include exceptional monitoring activities

Finally, Table 22 provides the breakdown according to the affiliation of the expert:

	Reviews 2014	Reviews 2015	Reviews 2016	Reviews 2017	Review 2018	Review 2019
Private	35	30	32	31	31	29
Public	31	20	23	18	16	8
Independent	8	4	5	9	9	15

Table 22: Affiliation of experts for reviews

Table 23 shows the results of the reviews for ECSEL projects as well as the websites. The appreciations under ECSEL are different than under FP7.

- EP = Excellent Progress: project has achieved beyond expectations
- GP = Good Progress: project has fully achieved its objectives and milestones for the period or has achieved most of its objectives and milestones for the period with relatively minor deviations
- GP- = Good Progress minus: project has achieved some of its objectives and milestones; however, corrective actions were or are required
- UP = Insufficient Progress: corrective actions and intermediate review are required

Call	Projects	1st Year	2nd Year	3rd Year	4rd year	Website
2014	3Ccar	GP	GP	GP (final)		https://assrv1.oth-aw.de/3Ccar/
2014	ADMONT	GP	GP	GP	EP (final)	https://admont-project.eu
2014	EXIST	GP	GP-	GP (final)		http://www.exist-project.eu/
2014	INFORMED	GP	GP	GP (final)		http://informed-project.eu
2014	MANTIS	GP	GP	GP (final)		http://www.mantis-project.eu
2014	OSIRIS	GP-	GP-	GP (final)		http://osiris-ecselju.eu
2014	POWERBASE	GP	GP	GP (final)		http://www.powerbase-project.eu
2014	R2POWER300	GP-	GP-	GP (final)		https://r2power300.eu/
2014	ROBUSTSENSE	GP-	GP-	GP (final)		http://www.robustsense.eu
2014	SENATE	GP	GP-	GP (final)		
2014	SWARMs	GP	GP	GP (final)		http://www.swarms.eu
2014	WAYTOGOFAST	UP	EP (final)			http://www.way2gofast-ecsel.eu/
2015	3DAM	GP	GP	GP (final)		No website
2015	AMASS	GP	GP	GP (final)		http://www.amass-ecsel.eu
2015	ASTONISH	GP	GP	EP (final)		http://www.astonish-project.eu
2015	DELPHI4LED	GP	GP	GP (final)		https://delphi4led.org
2015	DENSE	GP-	GP-	GP	Final review 2020	http://www.dense247.eu
2015	ENABLE-S3	GP	GP	EP (final)		http://www.enable-s3.eu
2015	ENSO	GP	GP	GP	Final review 2020	http://enso-ecsel.eu
2015	IoSENSE	GP	GP	EP (final)		http://www.iosense.eu
2015	PRIME	GP	GP	GP (final)		http://www.prime-h2020.eu/index.php
2015	REFERENCE	GP	GP-	GP	Final review 2020	http://reference.ecsel.soitec.eu/
2015	SAFECOP	GP-	GP-	GP- (final)		http://www.safecop.eu

2015	SEMI40	GP	GP	EP (final)	http://www.semi40.eu
2015	TAKE5	GP	GP		
2016	AQUAS	GP	GP		http://aquas-project.eu/
2016	AUTODRIVE	GP	GP		www.autodrive-project.eu/
2016	CONNECT	GP-	GP-		http://www.connectproject.eu/
2016	EUROPATMASIP	GP	GP		http://www.europat-masip.eu/
2016	I-MECH	GP	GP		https://www.i-mech.eu/
2016	MegaMaRt2	GP	GP		https://megamart2-ecsel.eu/
2016	MICROPRINCE	GP	GP-		https://microprince.eu/
2016	Productive4.0	GP	GP		http://productive40.eu/
2016	R3POWERUP[22]	EP			https://r3powerup.eu/
2016	SCOTT	GP	GP		https://scottproject.eu/
2016	SILENSE	GP-	GP-		https://silense.eu/
2016	TAKEMI5	GP	Review feb 2020		no website
2016	TARANTO	GP			http://tima.univ-grenoble-alpes.fr/taranto/
2016	WINSIC4AP	GP			https://www.winsic4ap-project.org/
2017	5G_GaN	GP-			https://www.5ggan2.eu/
2017	AfarCloud	GP			http://www.afarcloud.eu/
2017	FITOPTIVIS	GP			https://fitoptivis.eu/
2017	HiPERFORM	GP			https://hiperform.eu/
2017	iDev40	GP			http://www.idev40.eu/
2017	OCEAN12	GP-			https://ocean12.ecsel.soitec.eu/
2017	POSITION-II	GP			http://position-2.eu/
2017	PRYSTINE	UP			https://prystine.eu/
2017	REACTION	GP			http://www.reaction-project.eu/news.php
2017	SECREDAS	GP			https://secredas.eu/
2017	WakeMeUP	GP-			http://www.wakemeup-ecsel.eu/
2017	COSMOS (CSA)	GP			
2017	CSA-Industry4.E	GP-			https://assrv1.oth-aw.de/3Ccar/index.php

Table 23: Results of the ECSEL project reviews

Under H2020, the projects have to provide at each reporting period a number of indicators regarding their progress. Those are provided in Table 24. Obviously only the projects from call 2014, 2015, 2016 and 2017 had anything to report on those indices. The figures are not always very accurate, certainly for the projects in 2014 and 2015.

22 The project started according to plan late and therefore had its first review in 2019.

Project Acronym	Call	Patents	Number of publications	Number of prototypes	Number of clinical trials	Companies introducing innovation(s) new to the market	How many of these are SMEs	Companies introducing innovation(s) new to the company	How many of these are SMEs
3Ccar	2014-1	5	70	0	0	0	0	0	0
EXIST	2014-1	7	40	20	1	11	5	11	5
MANTIS	2014-1	2	55	61	0	29	3	32	13
OSIRIS	2014-1	0	9	1	0	3	1	1	1
RobustSENSE	2014-1	0	9	1	0	3	2	10	2
SWARMs	2014-1	1	7	3	0	0	0	0	0
ADMONT	2014-2	1	11	240	5	2	1	3	2
InForMed	2014-2	4	6	10	6	16	14	9	8
PowerBase	2014-2	7	78	0	0	0	0	0	0
R2POWER300	2014-2	0	0	1	0	0	0	0	0
SeNaTe	2014-2	34	55	83	0	31	4	31	4
WAYTOGO FAST	2014-2	7	97	2	0	13	5	13	5
3DAM	2015-1	9	17	22	0	10	2	9	2
AMASS	2015-1	0	89	1	0	11	4	13	2
ASTONISH	2015-1	1	10	6	5	8	5	8	5
DELPHI4LED	2015-1	0	54	0	0	0	0	0	0
DENSE	2015-1	36	15	2	0	9	3	16	5
PRIME	2015-1	0	27	8	0	11	6	11	6
REFERENCE	2015-1	15	19	0	0	0	0	0	0
SafeCOP	2015-1	0	67	0	0	0	0	0	0
ENABLE-S3	2015-2	9	89	15	0	27	11	15	2
EnSO	2015-2	12	16	2	0	15	6	11	4
IoSense	2015-2	11	117	9	0	12	4	12	4
SemI40	2015-2	0	159	32	0	9	4	17	4
TAKE5	2015-2	15	20	26	0	11	1	10	1
AQUAS	2016-1	0	23	12	0	10	4	9	4
AutoDrive	2016-1	10	43	0	0	0	0	0	0
CONNECT	2016-1	0	27	22	0	7	4	7	4
I-MECH	2016-1	0	25	0	0	11	4	5	1
MegaMaRt2	2016-1	0	68	0	0	0	0	0	0
SILENSE	2016-1	0	12	0	0	0	0	0	0
TARANTO	2016-1	2	77	0	0	0	0	0	0
WInSiC4AP	2016-1	0	13	8	0	11	5	0	0
EuroPAT-MA-SIP	2016-2	0	7	6	0	14	7	14	7
MICROPRINCE	2016-2	0	11	3	0	5	2	5	2
Productive4.0	2016-2	1	75	0	0	0	0	0	0
R3-PowerUP	2016-2	0	9	0	0	25	7	25	4
SCOTT	2016-2	0	49	753	0	14	6	5	3
TAKEMI5	2016-2	8	28	45	0	26	4	20	4

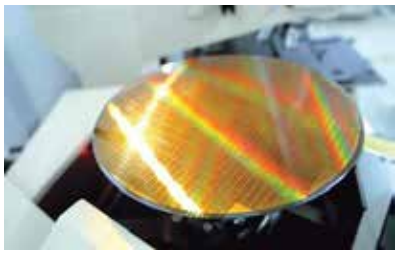
iDev40	2017-1	0	48	0	0	0	0	0	0
OCEAN12	2017-1	4	2	0	0	0	0	0	0
POSITION-II	2017-1	0	2	0	0	0	0	0	0
REACTION	2017-1	0	6	7	0	17	6	17	6
TAPES3	2017-1	0	4	0	0	0	0	0	0
WAKeMeUP	2017-1	0	20	3	0	11	1	11	1
5G_GaN2	2017-2	0	0	0	0	0	0	0	0
AFarCloud	2017-2	0	16	0	0	0	0	0	0
FITOPTIVIS	2017-2	0	8	0	0	0	0	0	0
HiPERFORM	2017-2	0	1	0	0	0	0	0	0
PRYSTINE	2017-2	0	16	0	0	0	0	0	0
SECREDAS	2017-2	1	4	0	0	0	0	0	0

Table 24: Progress indicators

5.7.2 Success stories of projects completed

The following success stories are related to projects that finished in 2019.

Project ADMONT (Advanced Distributed Pilot Line for More-than-Moore Technologies)



The "Advanced Distributed Pilot Line for More-than-Moore Technologies" project (ADMONT) focused on a powerful and versatile More-than-Moore (MtM) distributed pilot line for Europe increasing the diversification of CMOS process technologies. The combination of existing expertise, technological capabilities and the manufacturing capacity of industrial and research partners creates a whole new ecosystem within Europe's biggest silicon technology cluster "Silicon Saxony".

The pilot line utilizes various MtM platform technologies for sensor and OLED processing in combination with baseline CMOS processes in a unique way and incorporates 2.5D as well as 3D integration of silicon systems into one single production flow. The technology modules, equipment and processes are not located in one single clean room, but are distributed between partners located in Dresden. This local concentration of micro- and nanotechnology facilities has various advantages for potential customer since it enables a short production cycle time and fast delivery. Such distributed MtM pilot line is unique in Europe as well as worldwide and will be implemented as "one-stop-shop" for partners and customer. It is supported by advanced design technologies to address the challenges of modelling and simulation of MtM relevant aspects like reliability, degradation effects, process variability, and IT solution aspects for MtM smart fabrication, fab automation and data processing to generate a smart infrastructure.

The distributed pilot line is working as an open platform and can integrate future technologies for autonomous and smart system solutions. ADMONT is focused on four main key applications: smart energy, smart mobility, smart health, and smart production and essential capabilities like semiconductor process equipment and materials, design technology and smart system integration.

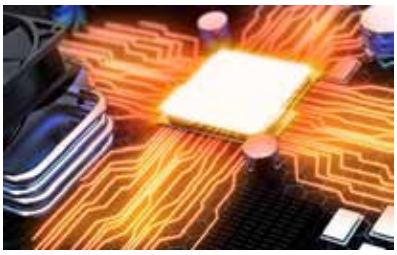
The project managed to integrate physically distributed wafer lines into one virtual fab with common interfaces and quality assessments. A virtual facility capable to provide diverse process flows as a 'one-stop-shop' has been implemented. The technology capabilities developed in the project cover a very wide field from HV-CMOS to 3D-integration and the foundry offering is still unique in the marketplace, after three years conceiving this concept. The project enabled for the first time in the world a complete process flow of inorganic and organic device manufacturing on an industry production scale.

The exploitable foreground is listed in the project reports. Of the 16 prototypes and demonstrators, 12 achieved a TRL of 7 or 8 and 8 patents have been filed. Demonstrators for key applications like lab-on-chip for smart health & diagnostics, RFID transponder systems for smart mobility, LED driver for smart energy and real time factory information system for smart production have been designed and manufactured.

Regarding SMEs, 2 SMEs have filed patents, recruited 7 people, and will launch smart health products: thermopile arrays for thermography, alcohol breath analyser, monolithically integrated pressure sensor, cancer cell diagnostic device. More will follow.

The project did an exceptionable job in the management (X-Fab was coordinator). All objectives were achieved and impact in terms of products released to market was high.

Project R2POWER300 (Preparing R2 extension to 300mm for BCD Smart Power)



The core of the R2POWER300 project was the development of process steps and modules for the power ICs in BCD10 90nm technology on 200mm wafers and feasibility tests at equipment supplier sites on 300mm wafers. This transition from 200 to 300mm will result in a substantial increase in productivity. For the project participants active as equipment manufacturers the project participation resulted in competitive advantages over non-European tool makers. The work carried out and reported followed the plan detailed in the DoW and the amendments. It delivered technology innovations.

Some important results of this project are:

- new process technologies and more efficient semiconductor manufacturing
- innovation in equipment technology by European manufacturers with large market potential (eg ASM furnaces,….)
- development of new design and simulation techniques and software

Project 3DAM (3D Advanced Metrology and materials for advanced devices)

3DAM has opened the path to new generations of metrology and characterization tools and processes, needed for the next semiconductor technology nodes: 3D transistor designs with very small dimensions, sub 10 nm technology nodes. The project developed state of the art innovative metrology solutions introducing capabilities that are currently not available and produced many prototypes. These innovative tools will generate the required process information needed to control future IC production lines.

For 3D characterization some resulting technology is already close to implementation. Examples are: EDX-STEM tomography; OCD hybrid system for in-line TSV characterization; Multi EDX system; HR XRD technology; cathode-luminescence prototypes; micro Raman system. Also, some products resulting from 3DAM will be introduced to the material science market as of 2020, e.g. the UltraX EDX detector of FEI "(now Thermo Fisher Scientific)". In-line as well as off-line tools for BEOL "(Back End Of Line)" geometrical measurements have also been successfully developed, meeting the x5 improvement target.

For the semiconductor market some of the technical developments of 3DAM were already implemented towards the end of the project. Examples are: i) the SEMVision Multi EDX system that is being implemented in the GAA (Gate All Around) process; ii) the HR XRD system which is used for 3D strain analysis; and iii) the cathode luminescence technology used for defect detection.

The development of some technologies (tip-enhanced Raman spectroscopy and Atom Probe Tomography) proved to be too difficult to be achieved within the scope of the project. Second harmonic generation spectroscopy and SEM –CL were not successful in measuring MX2 materials, but alternative methods were identified and developed like Raman spectroscopy.

All other technology that was developed was successful and delivered results at TRL level 5 or above. The ECSEL project MADEin4 aims at bringing the developed metrology technologies to higher TRL levels (7-8) that are relevant to the high-volume semiconductor environment.

The project generated 17 publications in peer reviewed scientific journals and delivered 33 contributions to international conferences. The project also organised 3 successful workshops. Nine patent applications were filed by the partners of 3DAM, 1 patent has been granted in the course of the project. Several more patent applications are in the pipeline.

Project AMASS (Architecture-driven, Multi-concern and Seamless Assurance and Certification of Cyber-Physical Systems)

Embedded systems have significantly increased in technical complexity towards open, interconnected systems. This has exacerbated the problem of ensuring dependability in the presence of human, environmental and technological risks. The rise of complex Cyber-Physical Systems (CPS) has led to many initiatives to promote reuse and automation of labor-intensive activities.

AMASS builds on the results of two large-scale projects OPENCOSS (FP7) and SafeCer (Artemis). Those dealt with assurance and certification of software-intensive critical systems using incremental and model-based approaches. OPENCOSS defined a Common Certification Language (CCL) and SafeCer developed safety-oriented process lines, a component model, contract-based verification techniques, and process/product-based model-driven safety certification for compositional development and certification of CPSs. AMASS evolved the OPENCOSS and SafeCer technological solutions towards end-user validated tools, enhanced and performed further research into new areas not covered by those projects. AMASS created and consolidated a de-facto European-wide assurance and certification open tool platform, ecosystem and self-sustainable community spanning the largest CPS vertical markets.

The achievement of the project goals has been quantified by means of a benchmarking process that was applied to the eleven industrial case studies, that span an impressive range of industries. AMASS also has delivered several key innovations across the field of multi-concern assurance. Among the major activities and results achieved:

- the project has provided a common architecture specified in the ARTA (AMASS Reference Tool Architecture) and the CACM (Common Assurance and Certification Metamodel).
- Guidelines about the global AMASS methodology and the usage of the platform have been released.
- A dashboard was designed to improve dealing with the complexity of the tools, and a proof of concept implemented.
- Improved design efficiency of complex Cyber Physical Systems is achieved through: efficient exchange between multidisciplinary teams for complex design decisions (in Papyrus and CHESS), when doing assurance and certification (OpenCert); efficient exchange of design assets using standardized languages for system architecture (SysML), assurance cases (GSN and SACM) and processes (SPEM2.0).
- Reduce costs and time for recertification of new versions of existing systems by using the proposed contract-based approach for design and assurance. By using EPF Composer for process modelling, integrated with OpenCert and BVR Tool, users are able to reuse process specifications across domains, company departments, practices and projects.
- Open source access improves the increased openness and interoperability of assurance and certification/qualification tool technologies. AMASS promotes an open and collaborative approach to the development of core technologies by embracing the open-source philosophy for the AMASS platform. All AMASS developments are being hosted by Eclipse/Polarsys community, as part of the OpenCert, CHESS and EPF Eclipse projects.

Exploitation intentions are credible and main challenges to market entry have been identified with promising individual exploitations plans. For example the AMASS partners have expressed their intention to exploit tens of foreground items, e.g.: OpenCert tool, Sabotage tool, V&V Manager, CHESS, OCRA, features to leverage Systems Engineering via TRC tools, OSLC-KM, DIVINE Verification Tool, and other technologies for system modelling, multi-concern system analysis, and for V&V, among others. In addition, several results are being or will be used and extended in other ECSEL projects (AQUAS, Arrowhead Tools, NewControl…).

Clarification between the IP and the open source philosophy in the project has been considered. The low number of patents is due to software nature of the results and activities.

To keep the innovations from the project alive, a community called Open AMASS Community has been created. This community manages the project outcomes for maintenance, evolution and industrialization. As the Eclipse Foundation is part of the AMASS consortium, the PolarSys/Eclipse community has been chosen as the best candidate to host AMASS. The current version of the AMASS Open Platform is available in the Opencert website (https://www.polarsys.org/opencert/).

Project ASTONISH (Advancing Smart Optical Imaging and Sensing for Health)

The ageing population and related increase in chronic diseases put considerable pressure on both the healthcare system and the society, resulting in an unsustainable rise of healthcare costs. As a result, there is an urgent need to improve efficiency of care and reduce hospitalisation time in order to control cost and increase quality of life. Addressing this need, medical applications need to become less invasive and improve disease detection, diagnosis and treatment using advanced imaging and sensing techniques.

The ASTONISH project has worked on the development of complete imaging and sensing technologies for monitoring, diagnosis and treatment applications by developing smart optical imaging technology that extends the use of minimally invasive diagnosis and treatment and allows for unobtrusive health monitoring. ASTONISH integrated miniaturized optical components, data processing units and SW applications into smart imaging systems that are less obtrusive, cheaper, more reliable and easier to use than state of the art systems. This also included algorithms for biomedical signal processing and multimodal data fusion process necessary to applications and the advanced user interfaces to support the professionals in their complex clinical tasks. These technology components have been integrated into specific solutions dedicated to applications such as physiological signal monitoring, tumour detection, minimally invasive surgery, brain function monitoring and rehabilitation.

The ASTONISH partners cover the full value chain, from semiconductor manufacturing to clinical centres testing the final application. The proposed innovations improve the global competitiveness of the European industry in the healthcare domain. Results were integrated in several use cases (some went into clinical trial):

- Integrated and miniaturized combo EEG/fNIRS with user-friendly graphical user interfaces,
- Integrated wireless and portable PPG-ECG system,
- Hyperspectral device that will capture a 3D thermal model of a patient's body,
- Hyperspectral camera system that enables real time instrument and patient body monitoring,
- Automatic, marker-less tumour detection,
- OCT and hyperspectral imaging technology on melanoma and non-melanoma carcinoma skin cancer lesions.

Multiple impacts for those developments are expected. They will allow physicians to record complex parameters for early detection of cardiovascular or metabolic risks. This includes the development of innovative portable devices that will allow early detection of brain abnormalities, which are today accessible only in hospital milieu. Moreover, ASTONISH has developed the next generation of medical systems for optical surgical navigation and automated detection of skin cancer using optical biopsy.

Exploitation plans foresee further development and commercialization of further products such as: augmented reality surgical navigation system, imaging components for smart things, image guided surgery system, molecular prognostic system, machine AI methods for health market, stroke rehabilitation system, hyperspectral camera for skin cancer detection, clinical decision support system for OCT based skin cancer detection, fluorescent image guided surgery system.

Project DELPHI4LED (From Measurements to Standardized Multi-Domain Compact Models of LEDs)

The European lighting industry aims at reducing cost, at continuously improving product performance while reducing time to market and enlarging the product. The main challenge for the design in of LED components into lighting systems is the temperature and current dependence of their performance. In order to achieve a good design of LED systems, a modular, multi-physics modelling approach is needed – this way allowing the freedom for LED component integrators to use such models in any kind of luminaire designs. In order to overcome those key challenges, seamless integration of the LED in the product development chain is necessary. For that a bridge, in the form of standardization, has to be established between the semiconductor industry and the LED component integrators.

The main achievement of the Delphi4LED project is in the realisation of a consistent compact modelling path addressing electrical, thermal and optical properties of LED systems that was translated in a set of standards. Those important standardization activities on the compact model progressed well during the project. The work of the TC2-84 CIE Technical Committee (Recommendations on LED package test data reporting) led to a Final Report in June 2019, followed by a proposition from NIST (USA) to submit the results for a complete standard. In June 2018 the CIE board validated the proposal of a new Technical Committee TC2-91 on "Optical Measurement Methods of LED Packages and LED Arrays", which may provide guidelines to enhance the precision of optical measurement. A format for data exchange was decided within the consortium. The JEP 30 xml format was chosen (D5.6), and a proposal was submitted to JEDEC JC-15 for adoption as a standard. The structured exchange of characterization data and model parameters as promoted through the standardization bodies (CIE and JEDEC) will foster the adoption by the broader community of tools and methods developed in Delphi4LED. This will push the responsibility of LED characterization to the LED manufacturers and simplify the development of luminaries.

Another excellent result is a software tool for luminaires design. The characterization procedures and the compact model methodology were adopted in the design of 4 lighting demonstrators, showing the potential to cut the design costs by 20% to 40%. This is mainly achieved by the reduction of measurements and prototype rounds.

Project EnableS3 (European Initiative to Enable Validation for Highly Automated Safe and Secure Systems)

ENABLE-S3 paved the way for accelerated application of highly automated and autonomous systems in the mobility domains automotive, aerospace, rail and maritime as well as in the health care domain. The developed virtual testing, verification and coverage-oriented test selection methods enable validation with reasonable efforts. The resulting validation framework ensures European industry competitiveness in the global race of automated systems with an expected market potential of 60B€ in 2025. Project results were used to propose standardized validation procedures for highly automated systems (ACPS).

The technical objectives addressed are:

1. Provision of a test and validation framework that proves the functionality, safety and security of ACPS with at least 50% less test effort than required in classical testing.
2. Promotion of a new technique for testing of automated systems with physical sensor signal stimuli generators, which will be demonstrated for at least 3 physical stimuli generators.
3. Raising significantly the level of dependability of automated systems due to provision of a holistic test and validation platform and systematic coverage measures, which will reduce the probability of malfunction behavior of automated systems to 10E-9/h.
4. Provision of a validation environment for rapid re-qualification, which will allow reuse of validation scenarios in at least 3 development stages.
5. Establish open standards to speed up the adoption of the new validation tools and methods for ACPS.
6. Enabling safe, secure and functional ACPS across domains.
7. Creation of an eco-system for the validation and verification of automated systems in the European industry.

ENABLE-S3 was strongly industry-driven. Realistic and relevant industrial use-cases from smart mobility and smart health defined the requirements to be addressed and allowed to assess the benefits of the technological progress.

The results achieved from the project will contribute to a better technical and procedural understanding of the Validation and Verifications (V&V) aspects pertaining to upcoming autonomous systems, in several of the domains investigated. As such, they will influence technical research at EU and national level, as well as guidelines for the combined virtual and real-world validation of such systems. The project has already demonstrated good impact potential in the following directions:

- reduced efforts to set up and execute CPS testing in various key application areas (automotive, aerospace, railways, maritime, farming, health);
- a significant influence on (safety and security) standards that goes beyond initial expectations, e.g., OpenDrive, OpenScenario, and OpenCRG are identified to become ASAM standards;
- open test architecture description and open-source design tools;

New products/innovations have already been introduced, such as: one new product line (Driving Cube at AVL), one spin-out company (Kontrol.tech). Such actions go beyond enhancing the innovation capacity and growth of the companies and pave the way to new markets that could address key industrial needs.

Furthermore, 15 patents have been filed or are in the process of, a large number (115) of peer-reviewed publications were published, there is vivid interest from outside the Consortium and outside Europe, the final event was very impressive and attracted more than 80 external visitors.

A 104-pages summary of results document is publicly available for download from the project website: https://www.enable-s3.eu/media/dissemination-material/ . A short movie explaining the project can be found under: https://youtu.be/Q2ggAuTV56E.

Project IoSense (Flexible FE/BE Sensor Pilot Line for the Internet of Everything)

The EU has set the stage to empower semiconductor manufacturing in Europe being one of the key drivers for innovation and employment and creator for answers to the challenges of the modern society. The objective of IoSense is to boost the European competitiveness of ECS industries by increasing the pilot production capacity and improving Time-to-Market for innovative microelectronics. This was accomplished by establishing three fully connected semiconductor pilot lines in Europe: two 200mm frontend lines (Dresden and Regensburg) and one backend (Regensburg) line networking with existing highly specialized manufacturing lines. The product focus top innovative, competitive sensors and sensor systems "Made in Europe" for applications in Smart Mobility, Society, Energy, Health and Production. The project achieved the initial goals to increase the manufacturing capacity of sensor/MEMS components in the involved pilot lines by a factor of 10 while reducing manufacturing cost and time by 30%. The time for idea-to-market for new sensor systems was brought down to less than one year! Some new product lines based on project results, like e.g. radar for automotive, have a very large manufacturing growth projection for the next years.

Project PRIME (Ultra-Low Power Technologies and Memory Architectures for IoT)

The goal of the PRIME project was to establish an open Ultra Low Power (ULP) Technology Platform containing all necessary design and architecture blocks and components which could enable the European industry to increase and strengthen their competitive and leading eco-system and benefit from market opportunities created by the Internet of Things (IoT) revolution.

PRIME project successfully developed a 22FDSOI technology platform, according to partner requirements, and qualify such SOI substrate product generation in production to deliver requested samples. By the end of the project several tape outs were available (Swarm node, PUF, MPSOC, etc.), some of them on GF 22FDX, technology that has been developed through this project. Other highlights of the project are the further improvement in STT-MRAM blanket layer performance and functional STT-MRAM device demonstrated with 22nm FDSOI select transistor and the successful demonstration of functional OxRAM technology.

Next to this, the PRIME project delivered the key components to enable a flexible design ecosystem for ultra-low-power technology platforms enabling IoT products:

- Memory System IP: Low power memory system IP was developed and accomplished major Power Reduction up to 60% Dynamic, 70% Shutdown, 70% Standby. Technology down to 22nm was explored.
- Power Management Unit: Low-power Analog to Digital Converter (ADC) for second generation LiDAR system developed and in tape-out preparation. Cut power consumption into half compared to previous generation.
- Special IP for IoT: Low power IP for secure key generation has been successfully integrated on the Swarm node System on Chip. Reduced power consumption by resource sharing for different functions (key generation and instruction cache).
- Ultra-low power IP: Application of Intelligent IP design flow in design and porting of a ADC in GF22FDX that prove that major parts of design and porting of ultra-low – power IP can be automated.

The eight demonstrators (2 more than originally planned) were successfully presented:

- a 22FDSOI Test Chip to test functionality of digital devices, passive devices and RF-devices during process development. In addition, a Multiple Purpose memory test-chip was developed based on 28nm technology.
- a demonstration board for the Swarm Node System on Chip
- a demonstration of the power consumption benefits of the IP developed in the project in the application context of 9D sensor fusion.
- the architecture, design and realization of two generations of PCB boards enabling fast prototyping
- a demonstrator that shows the properties of the designed security architecture for low-power IoT environments
- a demonstrator for a realistic use case for NB-IoT
- a ranging IC measuring distance between two nodes
- a predictive maintenance algorithm executed on chip and further transmission of the data over IP network using edge router with the IMEC Mbit OxRAm array

The dissemination activities of the project include12 journal publications and 20 conference proceedings. In total there were 6 patents filed and 1 patent opportunity identified.

Project SAFECOP (Safe Cooperating Cyber-Physical Systems using Wireless Communication)

SafeCOP established a safety assurance approach, a platform architecture, and tools for cost-efficient and practical certification of cooperating cyber-physical systems (CO-CPS). SafeCOP targets safety-related CO-CPS characterized by use of wireless communication, multiple stakeholders, dynamic system definitions, and unpredictable operating environments. In this scenario, no single stakeholder has the overall responsibility over the resulted system-of-systems; safe cooperation relies on the wireless communication; and security and privacy are important concerns.

The main project results comprised:

1. a SafeCOP Safety Assurance Framework,
2. SafeCOP extensions to current wireless technologies regarding safe and secure communications, and
3. SafeCOP reference platform.

The consortium investigated the applicability of the above in the context of a good range of use cases addressing important societal challenges with the developed enhanced "Technology Bricks", supporting commonality and re-usability of the methods, tools and technologies.

Some project outcomes are close to market entry and it has been reported that they are already in a process of integration in customer products. Some tangible project outcomes are (non-exhaustive):

- Hazard analysis methods for cooperative systems,
- Quantitative safety analysis,
- Safety assurance network,
- Safety run-time and cooperative monitoring mechanisms,
- Wireless safety and security layers,
- Vehicle platooning simulator and testbed,
- V2X simulators.

Other impacts of this project include: the creation of start-up, the delivery of a patent training course, a standardization study that show potential for increased impact.

As all the results are software tools it is interesting to understand how SafeCOP results will be exploited. They are a mixture of proprietary and open source IPs. Proprietary IPs will be protected by Copyright or kept as Trade Secrets by the partners. For the Open source IPs, the SafeCOP consortium decided to largely align with CHESS, a model-driven, component-based methodology and tool support (originating from the ARTEMIS project CHESS) for the definition and development of high-integrity systems for different domains. CHESS, which is provided and continuously maintained by the SafeCOP partner INTECS, is distributed under open source Eclipse (EPL). The goal is in the preliminary steps to distribute the SafeCOP features and support their wide usage following the open access strategy. After this first phase, some SafeCOP specific customization of CHESS will be more restrictively protected (e.g. using copyrights) and IP will be exploited through Non-exclusive license. More specifically, the industrial departments of INTECS (operating in the Transportation, Smart Systems, Aerospace and Defence), will analyse the new CHESS features, which will be available from the SafeCOP project. Then, the Consortium envisions a three phases strategy:

1. Submission of the developed technology to the Eclipse Polarsys as open source under EPL license;
2. Initial period for internal usage, experimentation (use case developments,) and maturation for commercial sales (about one or two years).
3. The commercially developed technology will be proposed to customers by adaptation and customization to their specific needs. (three to five years).

One feature of the CHESS Modelling Language (CHESSML) particularly relevant in SafeCop is the support for component and contract-based design. CHESS is also integrated with OpenCert, the Eclipse open source product and process assurance/certification management tool to support the compliance assessment and certification of safety-critical systems.

Furthermore, the SafeCOP joint exploitation plan is organised per use case, with specific reference to the Intellectual Property (IP) associated to the SafeCOP Technological Bricks (TBs). The consortium organised agreements between partners for the commercialization of the demonstrators, summarised below:

- Component/Subsystem Agreement: it regulates the cost of each component or subsystem included in the SafeCOP product.
- License Agreement: it regulates the license fee for each component or subsystem (SW, Architectural Design, Specifications, etc.).
- Sales Agreement: it regulates the sales fee.
- Reference Sale Price: The Reference Sale Price (RSP) will be defined by a commonly agreed formula.

Besides the CHESS open source platform, some SafeCOP partners will also exploit their project results individually via other open source platforms or will copyright them.

The SafeCOP has a YouTube channel: https://www.youtube.com/channel/UCu6ky5rzirVa6rgR1eMge2g/videos?view_as=subscriber

And some final demonstrator are shown on: https://www.youtube.com/watch?v=olBdRzhpJpU

Project Semi40 (Power Semiconductor and Electronics Manufacturing4.0)

SemI40 responds to the urgent need of increasing the competitiveness of the semiconductor manufacturing industry in Europe through establishing smart, sustainable, and integrated ECS manufacturing thus paving the way for serving highly innovative electronic markets with products powered by microelectronics "Made in Europe".

The main objectives were balancing system security and production flexibility, increase information transparency between fields and enterprise resource planning (ERP), manage critical knowledge for improved decision making and maintenance, improve fab digitalization and virtualization, and enable automation systems for agile distributed production.

Through advancing manufacturing of electronic components and systems, SemI40 contributes to safeguard more than 20.000 jobs of people directly employed in the participating facilities, and in total more than 300.000 jobs of people employed at all industry partners' facilities worldwide.

The project has delivered exceptional results with significant immediate or potential impact, as for example:

- Solutions for challenges ranging from secure gateway to translators between legacy protocols and Industry4.0 protocols, including dividing networks into zones dependent on characteristics and needs were developed. Among others, a hardware-based security solution was developed to manage security in environment with such legacy equipment and software subsystems, which was validated in a testbed.
- Work on the job scheduling environment progressed very well. The transfer of first products into the production

system was realized, demonstrating better control of the production steps. This deployment provided quantitative results with measurable financial gains.
- Regarding energy efficiency, concepts and infrastructure for the use case roll-out were developed and the optimization potential of the individual application fields have been implemented at the three different customer sites, IFD, IFAT and Elmos. The potential energy reductions indicated is substantial (order of 10%).
- a cyber physical production systems (CPPS) for 'insecure devices" was built and was extended to drone systems in another ECSEL project COMP4DRONES;
- self-adaptable CPPS were built and demonstrated and applied to test systems in other ECSEL projects Productive 4.0 and Arrowhead Tools;
- development of swarm intelligence for fleet management in a manufacturing environment with new dispatching strategies and implementation in several waferfabs

Although the applications were developed in a particular manufacturing environment (so called waferfabs, IC manufacturing) the uptake in other environments of the developed products/tools by other companies is on-going. The number of publications was high, 150, which is a good indication of strong collaborations in the consortium. A book focusing on the core objectives of the project was published that provides a good description of the use cases (http://www.semi40.eu/Book.html). "Roadmaps" have been produced for all the WP's, giving both the history and future view of the project exploitation which provide a clear overview of potential opportunities, both in wafer fabrication and potentially for other applications. This includes links to active or planned future collaborative programmes.

The project was essentially oriented to the development of software and therefore did not result in patent applications but achieved apart from the impressive number of publications also 32 prototypes, 33 testing activities (feasibility/demos) , 9 companies introducing innovations to the market (out of which 4 are SMEs) and 17 companies introducing innovations to the companies (out of which 4 are SMEs).

Project Take5 (Technology Advances and Key Enablers for 5nm)

The main objective of the TAKE5 project is the demonstration of 5nm patterning in line with the industry needs and the ITRS roadmap in the Advanced Patterning Center at the imec pilot line. It used innovative design and technology co-optimization, layout and device architecture exploration, and comprising demonstration of a lithographic platform for EUV technology, advanced process and holistic metrology platforms and new materials to achieve this objective. The project touches the core of the continuation of Moore's law which has celebrated its 50th anniversary and covers all aspects of 5nm patterning development

For the 5nm technology modules, new materials are introduced which brings challenges for all involved deposition processes and the related equipment set. A lithography scanner based on EUV technology was developed, to achieve the 5nm module patterning specification, along with metrology platforms qualified for 5nm patterning of 1D, 2D and 3D geometries with the appropriate precision and accuracy. Next to new deposition processes, the interaction of the new materials with subsequent etch steps was studied, and the project successfully identified the best options for patterning.

The objectives were successfully achieved:

- Upgrading of the EUV lithography tool to full 5nm specifications and its validation, even exceeding original targets.
- Detailed project of the 0,55NA anamorphic lens for next generation 3nm equipment and start of component manufacturing.
- Development the metrology platform and its testing on wafers.
- The development and demonstration of critical process steps for 5nm CMOS, including also the investigation of innovative process architectures.

As a general evaluation, the execution of this project has been carried out at an excellent level, and has given impressive results. An impressive 15 patents were submitted.

5.8 Operational budget execution

The EU budget allocated has been engaged in its entirety. Further details on the budget consumption are in Annex II (Chapter 9.2)

5.9 Other topics

5.9.1 Lighthouse Initiatives

The Lighthouse Initiatives were introduced to signpost subjects of common European interest, and to accelerate the impact of R&D&I projects by promoting collaboration and fostering a continuous dialogue within the ECS community and between the ECS community and technology users, decision-making bodies and society so that technologies and innovations have a real and faster impact on business, the economy and consumers.

Industry4.E Lighthouse Initiative

Industry4.E lighthouse focused on three themes:

- input into Industrial Digitalisation road mapping
- development of a communication platform
- support and assistance to effectively exploit the Industry4.E project results

Regarding the first focus: **input into Industrial Digitalisation road mapping,** the associated CSA carried out an extensive review of relevant roadmaps and activities in Europe, identifying overlaps, complementarity and added value with respect to the ECSEL MASP and ECSEL projects. The results of this study allowed, on one hand, to include as important challenge in the ECSEL WP 2020 one selected topic (Artificial intelligence enabled inclusive and resilient manufacturing – The Human in the Loop) among the group of identified gaps by the research. On the other hand, two new grand challenges (Human-centred manufacturing and Sustainable manufacturing in a circular economy) were added to the Digital Industry chapter of the ECS SRA 2020 while other previous challenges were extended.

The second focus: **development of a communication platform** must facilitate interaction between projects and between stakeholders, stimulating cooperation on technical and operational levels and promoting best practice in addressing cross-cutting issues. A demo version of the platform has been successfully demonstrated during this first year, the launching of which is planned for the second year of the CSA.

Important advances happened as well in **bringing projects together**. During 2019, four new projects were added to the lighthouse, Arrowhead Tools, MADEin4, CPS4EU and AI4DI, bringing to 13 the number of ECSEL projects participating in Industry4.E. As well, an Industry4.E projects' dedicated workshop took place next to the ECSEL Symposium in Bucharest focused on networking and exploring potential collaboration across projects.

The third focus: **support and assistance to effectively exploit the Industry4.E project results**, knowledge transfer, impact measure and communicate success stories to wider society in a non-technical manner was supported by the development of a dissemination and exploitation plan including a range of support measures and tools to Industry4.E projects. As part of this plan, a first workshop "Creating Knowledge Impact through Knowledge Transfer for the Industry4.E Lighthouse Project Community" took place next to EFECS 2019 in Helsinki on 21st November 2019.

And last but not least, during 2019, **visibility of Industry4.E lighthouse** was raised, face to face (presence on more than 10 relevant events) and via social media (website, twitter…), to the broader public and related initiatives in order to increase the social impact and uptake of digital innovation, as well as to reinforce the links between Indsutry4.E projects and transnational, national and regional initiatives.

Mobility.E Lighthouse Initiative

The increasing levels of vehicle electrification and automation are causing fundamental changes in the automotive field, primarily a rising complexity of R&D&I challenges and the associated diversification of the stakeholder circle. There is, therefore, a need for the continuous identification and prioritisation of research topics as well as for network support measures to foster collaboration among stakeholders and to exploit potentials for cross-sector collaboration. It is furthermore important to not only establish and maintain an overview of the ECAD field but also to leverage this knowledge to coordinate R&D&I activities and to align strategic plans.

This Lightouse Initiative has in 2019:

- Established links between the different stakeholders of the automotive value chain (traditional automotive and ECS) through the organizations participating to the LIASE: Virtual Vehicle, EARPA, SINTEF, AVL, NXP, Valeo, Infineon, ARTEMISIA, FCA, ERTRAC, EUCAR, EGVI, ERTICO,
- Adopted the set of ERTRACs European roadmaps on: Connected Automated Driving, Safe Road Transport, Electrification of Road transport and Integrated Urban Mobility as a base to identify gaps related to ECS R&D&I activities.
- Maintained dynamic communication with the broad mobility ecosystem trough the organization of the ECA2030 fora, that has become the networking forum for the between the traditional automotive industries, ECS ecosystem and local/regional communities addressing mobility challenges.
- Organized two events in 2019:
- Workshop event Gratz May 2019
- Topic update & Prioritization Networking event Brussels Sep 2019
- Updated the list of burning topics for research (gap analysis) as input for the SRA and ECSEL workplan.
- Established the communication and collaboration platform for the involved road mobility communities. The platform is planned to be finalized and put into usage during 2020.

Health.E Lighthouse Initiative

The Health.E Lighthouse Initiative will accelerate the innovation in medical devices and systems by stimulating the development of open technology platforms and standards, thereby moving away from the inflexible and costly point solutions that presently dominate electronic medical device manufacturing. These open technology platforms, supported by roadmaps, will generate the production volumes needed for sustained technology development, resulting in new and better solutions in the healthcare domain.

In 2019, the Health.E LIASE held 2 meetings and organised 1 workshop. About 15 projects (from ECSEL, PENTA and H2020) were presented during the workshop at EFECS. A first draft of a mission/vison document was prepared. The roadmap gap analysis has started and will be continued with HELoS. The field of bioelectronic medicines was identified as very promising for the treatment of many auto-immune diseases that are now exclusively catered by pharma. This will need further miniaturization of complex heterogeneous systems, power management and low power AI computation. The Health.E vision will be further developed during a workshop in May 2020 (organised by HELoS, the CSA selected to support). Contacts with 12 projects have been established and will be invited for this workshop.

The close discussion with IMI on a joint activity was concluded with the approval in the WP2020 on a special call.

5.9.2 Status of Lighthouse Initiatives' CSA

2019 also saw the first results of the CSAs launched in 2018 and begin 2019 and that support the three lighthouse initiatives.

CSA- Industry4.E

This project supports the Industry4.E lighthouse. It is a two-year project and 2019 was the first year. The project has made good progress (considering the unexpected departure of the person leading the project), especially with respect to visibility and roadmap/gap analysis. Results have been used to improve the ECS SRA 2020. Overall the project supported well the ambitions of the lighthouse initiative.

Relatively limited planning has gone into the engagement of citizens and the task relies primarily on a short campaign to be executed by a social media agency. This task should be broadened to larger audiences and careful consideration needs to be taken on the execution.

COSMOS (Coherent Support for Mobility.E Strategy)

This project supports the Mobility.E lighthouse initiative. It is a two year project that started in September 2018.

It is organized around two components: a strategy development process, and network support. The Strategy Development process component has been structured as a three-step process: mapping of the ECAD Ecosystem, mapping of the R&D&I funding landscape and Gap Analysis and facilitation of the elaboration of R&D&I implementation plan, addressing the identified gaps. The first of three work packages (mapping of ECAD Ecosystem) has been completed and allows for the analysis of the mapped ecosystem and the definition of actions to reach the Lighthouse objectives. The network support component serves to assure an active exchange throughout and beyond the automotive value chain and to establish a strong link between the ECS and application sides of the value chain in automotive and clean and automated mobility in general. This activity has advanced by defining, expanding and strengthening the stakeholder circle and by organizing and participating in collaboration and networking events

aimed at defining research priorities and accelerating ECAD deployment. Both activities will be continued in the second period of the project, with an expected augmentation of the impact and awareness for the solutions designed to ensure that the socio-economic benefits of ECAD can be reaped as soon as possible in Europe in particular. Due to the dynamic evolution within the mobility sector, these activities must necessarily go beyond the traditional automotive business model and also need to take, novel mobility solutions, as well as the non-technical aspects associated with these changes, into account (e.g. the creation of a suitable legal framework for the operation of autonomous shuttles on public roads).

HELoS

A call for CSA was launched in February 2019 and the selected HELoS project started in July 2019. The CSA will support Health.E along 3 pillars. A first one is to create awareness in the ECS community for emerging opportunities. This will be done by identifying gaps in strategic research agendas (SRA) and by translating the needs of medtech and pharma into ECS language. The second pillar is to promote the open technology platform model described above. The third pillar is to create a sustainable ecosystem consisting of technology suppliers, device manufacturers and end-users. This ecosystem will transcend project boundaries and will connect to other European initiatives and communities

5.9.3 Punctual appointment of other experts

No ethical evaluation of the selected proposals was needed in 2019.

For the assessment of the evaluation procedure 2 experts were appointed by the GB (GB.2019.125).

5.9.4 Gender balance in ECSEL projects

The total female staff involved in all the ECSEL projects[23] (therefore for projects of 2014, 2015, 2016, 2017 and 2018) amounts to 20% of the beneficiaries' staff involved, of which 13% are involved in research activities and 7% in non-research activities. For the remaining 80% males, 64% are involved in research while 16% are involved in non-research activities.

5.9.5 Role of regional funding

Several European regions are actively participating in the funding of projects.

- In Germany Saxony has been a strong supporter from the beginning of ECSEL and in 2018 Thuringia joined.
- In France, the AURA region is systematically co-funding some French partners in ECSEL projects.
- In Italy, Lombardia, Emilia Romagna and Sicilia have formalised some agreement but only Lombardia has signed an ECSEL JU Grant Agreement until now. Piemonte is interested in participating.

Partners from Romania, Latvia and Italy participate in ECSEL projects with ESIF funding but without H2020 funding.

5.9.6 Some considerations on the perceived value of ECSEL IA-projects

A workshop organised during the EFECS on the pilot lines revealed a number of elements in assessing the importance of ECSEL projects in particular the IA-projects (formerly known as pilot lines). The event documentation is available via the ECSEL JU website at: https://www.ecsel.eu/news/efecs2019-pilot-lines-impact-workshop.

ECSEL IA-projects have typically above-critical mass, allowing to include in the project more easily partners from the technology/supply chain and the value chain.

The inclusion of value chain partners help to strengthen demand in Europe, attract manufacturing capabilities, maximize the impact through strategic markets, including value chain partners is the motorway to accelerate co-innovation and market adoption

Such projects that mobilise communities with a mix of companies and public research organizations help to build trust between industrial partners and research partners but also between partners along value chain. This reinforces the partnerships.

Those partnerships support the creation of project pipelines that allow for long-term continuity in the actions through follow-up projects. Although follow-up projects are evaluated as all other submitted projects, they tend to be more successful in the evaluation because they tend to be more credible for the experts in all aspects of the evaluation and in the selection because the participating states have a better feeling for the potential impact of those projects in view of the historical record.

- Such projects also help pushing new products/technologies in new markets, starting new companies
- They allow the exploitation of synergies across application and technology domains
- They also support working across competition and thus benchmarking technologies and sharing innovation risk
- Through the universities involved, those projects also allow the education of engineers in new technologies.

23 Some projects with manifestly wrong figures were excluded, for example when the total number of people in the project is smaller than the number of organizations in the project)

5.10 Support to Operations

5.10.1 Communications and Events

5.10.1.1 Internal Communication

The practice of engaging all staff in regular and frequent information exchange meetings was continued in 2019, with increasing participation by absent colleagues via videoconferencing. The meetings offer a medium for keeping all staff abreast of developments in our often quickly changing environment, while offering an open platform for asking questions or giving feedback.

As an internal communication activity to strengthen cohesion between all staff, a "holiday photo" competition was organised, with winners – who received a framed print of their image and a certificate–indicated via a "people's choice" voting.

5.10.1.2 External Communication

The ECSEL JU also initiated intensive external communication activities. Among the highlights of these are:

5.10.1.2.1 Publications produced:

The collaboration with OIB, started in earnest in 2018, as a main resource for production of publications was continued. While most publications are designed for on-line (paperless) publication, a small number of printed copies are made, to serve as marketing and publicity aids.

- *Annual Activity Report 2018*
- *Refurbished look and content of the general ECSEL JU brochure*
- *A number of project posters printed for annual events*
- *ECSEL JU Symposium leaflets*
- *Stickers and bookmarks*

5.10.1.2.2 Press activities:

Press releases and articles

ECSEL JU issued the following releases in 2019:

- Finalization of the financing decision of ECSEL JU Calls for 2018 announcement (May 2019)
- Dr Sabine Herlitschka re-elected as the Chair of ECSEL Joint Undertaking GB (Nov 2019)
- Election of Mag. Doris Vierbauch as Chair of the ECSEL JU Public Authorities Board (Nov 2019)

Published Articles

By activating connections with the communications facilities of the European Commission via the "CORDIS" system, several ECSEL JU funded projects were selected for focus article and/or "results in brief" pages, including AutoDrive, Prystine, EXIST, InforMed, Mantis, SWARMS, Enables-3, Astonish, …

Media Coverage

Media tracking of third-party publications about ECSEL JU is done ad-hoc and entirely with internal resources – no recourse has been made to external services as yet.

5.10.1.2.3 Events

Events establish links between the various stakeholders, bring together ECSEL JU community, provide a space for networking and raise awareness about the latest ECSEL JU activities, strategies and work plan.

Highlights

In 2019, the ECSEL JU Office, together with the Commission and Private Members Stakeholders, organised or attended many events during the course of the year. The Symposium 2019 was held in Bucharest, organised as part of the Romanian Presidency official events.

Brokerage / Call Forum (January 15+16 2019)

Organised by the Industry Associations, the event brings together a broad section of the RD&I community around project proposal ideas, with a view to building consortia. ECSEL JU participated, with information about the planned Calls in 2019, and also gave 15' "Air time" to IMI to inform about their Calls (this is part of a strategy to engage actors who are relevant for ECS but are not necessarily part of the existing community).

Permanent Representations meeting, Jan 23rd

Held on the evening between its PAB and GB meetings, ECSEL JU invited relevant staff of the Permanent Representations to meet with PAB delegates. As an informal meeting, it is meant to assure proper "Bridge" between ECSEL JU Governance and Member State decision influencers in Council.

Symposium 2019 (Bucharest)

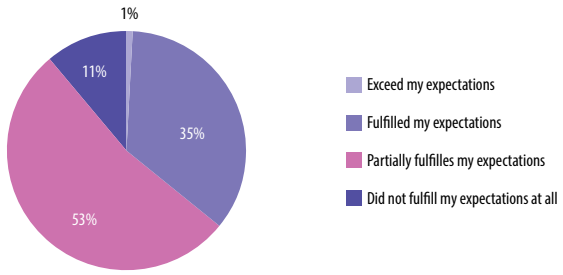
Following the previous editions held in Malta and Brussels, ECSEL Joint Undertaking's Symposium for 2019 was held under the auspices of the Romanian Presidency of the Council of the European Union. The event was organised with the help of a contractor, selected via the Procurement Procedure launched in 2018. The 2019's edition drew a lot of interest and a high number of participants, with only a small percentage of no-shows (284 attendees out of 311 registrants,).

The programme of the event was designed to go beyond a discussion about technical aspects of the ECSEL JU programme. The panel sessions not only demonstrated the political and societal importance of the ECSEL JU programme, they also presented the added value of the ECSEL JU as an effective European collaborative RD&I instrument. The event was propped up by a number of impressive keynote speeches, given by such names as Lars Reger Chief Technology Officer at NXP, or Martin Wezowski, Chief Designer & Futurist, Technology & Innovation at SAP.

Exhibition – based on LCD SCREENS (no paper posters): In total, 58 screens, with 8 Organisations, 3 Lighthouse Initiatives' CSAs, 47 showing project results! Guided tours were organised, and one project cluster (the "More-Moore" cluster, led by ASML) was awarded the Dissemination Award, for the clear way in which their work was explained to informed but non-specialist guests who participated in the guided tour.

The event was followed by a Satisfaction Survey available to all participants. The Survey was built of 16 questions related to different parts of the event, from logistics, organization to detailed agenda. The results of the survey were overwhelmingly positive, with a big number of Survey attendees describing various aspects of the event as exceeding or fulfilling their expectations.

General organization of the Symposium



There were challenges, due mostly to the distance and arm's-length preparation, but the ECSEL JU Office communications team, with support from colleagues of the Associations, were able to ensure a highly professional and "finished" event.

Several side-meetings were hosted, that benefitted from the Symposium organization: the Electronics Leaders Group (on behalf of the Commission), an ECSEL JU Working Seminar (with Industry + ECSEL Participating States, two Lighthouse Initiative meetings, a GB and a PAB meeting.

For the 2019 edition of the ECSEL JU Symposium, the office teamed up with an event app hosting organization to create a mobile app to enhance the conference attendees' experience. The app was full of useful practical information about the Symposium, including tips about moving around the venue, a detailed event agenda, info about the speakers, as well as a full exhibition display and description of each ECSEL JU project attending the conference. The app featured a number of networking tools to make the interaction between the participant easier and more enjoyable.

ICT Proposers Day (18-19 September, organised by DG CNECT in Helsinki)

ECSEL JU was present with an information booth, displaying presentations and videos on a large LCD screen, while distributing minimal paper brochures. Due to the extremely visible location, the ECSEL JU booth enjoyed a lot of traffic, with at times participants waiting in line to ask their questions. The experience showed once more that ECSEL JU is well known to people who know about European funding mechanisms but is completely unknown outside of that circle.

R&I Days Brussels, 24-26 September (DG RTD event)

ECSEL Joint Undertaking was invited to showcase a few remarkable project results during the European Research & Innovation Days 2019. We presented some very high-profile project demos, including an E-Powered Glider, PRYSTINE/AutoDrive/3Ccar projects display, a car with advanced Driver Assistance (Valeo), and a set of drone prototypes from the project Comp4Drones. Each of these projects brought great interactive demonstrators and explained their main goals and objectives to exhibition visitors, which included several notable names, such as Mrs Maria da Graça Carvalho, MEP, Mr Nicolae Hurduc, the Romanian Minister of Research & Innovation, Mr Krasimir Valchev, the Minister of Science and Education in Bulgaria, and many more.

Impact Visits

ECSEL JU Office organised, together with local beneficiaries of the ECSEL JU programme, some visits with representatives of the ECSEL Public Authorities, such that they can witness first-hand the fruits of the projects that they have collectively helped to finance. The first of these, on 2+3 October, was to Austria–Graz and Villach, both towns being home to some important participants in ECSEL JU projects. A second visit, this time to the Eindhoven area, timed to make use of the relative proximity to Brussels and a previously planned Governing Board meeting, saw similarly successful participation. The meetings, where some spectacularly positive impacts of ECSEL JU programme were in evidence, were very constructive and generally well received.

Similar visits to the Grenoble / Crolles area, and others still to be defined, are being set up for 2020.

EFECS–November 19-21, Helsinki

The third edition of the European Forum for Electronic Components and Systems took place in Helsinki from the 19th to 21st of November 2019 under the theme "Our Digital Future", jointly organized by the ECSEL JU, the three industry associations ARTEMIS-IA, EPoSS and AENEAS, and the European Commission and in association with EUREKA. The event gathered more than 650 participants, including high level industry and research representatives, as well as a wide range of crucial decision makers in the ECS sector. This three-day conference offered a lot of networking possibilities for 70 running projects, including more than 20 ECSEL JU projects presented at the event, as well as 16 brand new project ideas.

Photos from EFECS: Simon Pugh Photography

5.10.1.2.4 *Website & Networks*

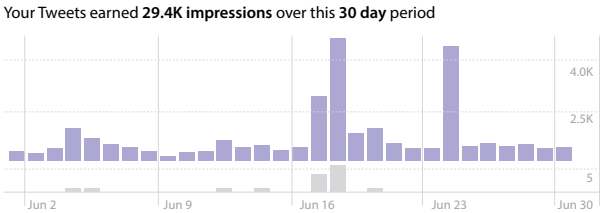
The website that went online in 2017 continued to be regularly updated, serving particularly as a useful vehicle for dissemination about ECSEL JU projects and events. Though no traffic analysis is yet integrated, user feedback is generally positive. With a view to the contract with the present hosting service coming to an end, a project was started to identify a new potential host. In the Commission, DG-DIGIT had made an offer that meets the needs of ECSEL, at a competitive price. Therefore, the site was transferred to be hosted by them (NB under "hosting" is to be understood all the technical resources needed to ensure the site is visible to the public over the Internet. All content is still provided and maintained by "Content editors" within the ECSEL JU Office – for the most part staff of the Communications unit).

Social Media:

- Twitter

ECSEL JU had continued actively using and updating Twitter account throughout the whole of 2019. The number of our followers went from 910 (as of December 2018) to 1154 (as of December 2019).

The peak of interest in ECSEL JU Twitter account was related to the Symposium 2019 in Bucharest, during which, and prior to, the staff created the most engaging organic content.



- LinkedIn

ECSEL JU had expanded the engagement with LinkedIn community in the entire 2019. The Communication Unit had carried out several LinkedIn campaigns, promoting the ECSEL JU activities and the leading events. ECSEL JU LinkedIn profile reached a peak of 605 followers in December 2019.

5 .10.1.3 Institutional Communications

To raise the profile of the ECSEL JU Programme within the EU institutions in the run-up to decisions about the future Framework Programme "Horizon Europe", and with the aim to increase awareness about the impact on the daily life of European citizens and key role in terms of technology independence played by electronic components and systems technologies, a set of institutional communication initiatives have been planned and implemented. See the table below.

18 Jan 2019	Meeting with the Permanent Representation of Belgium to the EU
23 Jan 2019	"Bridge builder" initiative: walking dinner with PAB and PerRep representatives. Guest speaker: Mr. Cristian STAICU, from the Romanian Presidency of the Council of the European Union
20 Feb 2019	Meeting with Mr Zdechovský, MEP (CZ Republic)
7 May 2019	Meeting with the Permanent Representation of Estonia to the EU
13 May 2019	Meeting with the Permanent Representation of Denmark to the EU
20 May 2019	Meeting with the Permanent Representation of France to the EU
23 July 2019	Meeting with Mrs. Irene Tinagli, MEP
25 Sept 2019	Meeting with Mrs Carvalho, MEP (PT)
26 Sept 2019	Mr. Krasimir VALCHEV, Minister of Education and Science of Bulgaria
26 Sept 2019	Mr. Nicolae HURDUC, Minister for Research and Innovation of Romania
8 November 2019	Mr. Mehmet Fatih KACIR, Deputy Minister of Industry and Technology of the Republic of Turkey, and Prof. Hasan MANDAL, President of TUBITAK, (The Scientific and Technological Research Council of Turkey).

Table 25: List of meetings with EU Institution representatives

Turkish delegation visits ECSEL JU Office on 8th November 2019. Fltr: Ezgi BENER (ECSEL PAB member, TUBITAK), Prof. Hasan MANDAL, (President, TUBITAK), Bert De Colvenaer (ECSEL JU Executive Director), Mehmet Fatih KACIR (Deputy Minister of Industry and Technology of the Republic of Turkey), Yves Gigase (ECSEL JU Head of Programmes), Alpaslan Mete KARACA (Director, International Cooperation Department, TUBITAK), Kasım GÖNÜLLÜ (Deputy Minister's Office)

5.10.1.4 Other outreach activities

On February 14th and March 4th 2019 respectively, groups of some 30 students each from the College of Europe Parma and University Polytechnica of Bucharest visited the ECSEL JU office in Brussels, where they were introduced to the work and ambitions of ECSEL JU and the reasoning behind them.

5.10.2 Legal and financial framework

Main decisions had been adopted at the time of the setup of ECSEL JU in 2014 by the Governing Board, the Public Authorities Board and the Executive Director.

In 2019, the Governing Board continued adopting decisions relating to the smooth running of the organisation as well as annual decisions: MASP, Work Plan, annual accounts, budget, assessment on the ED Annual Activity Report.

5.10.3 Procurement and contracts

Procurement and contracts are managed in accordance with the provisions of ECSEL Financial Rules and coordinated within the ECSEL Administration & Finance team.

In order to reach its objectives and adequately support its operations and infrastructures, ECSEL JU allocated funds to procure the necessary services and supplies. In the context of sound financial management and efficiency, ECSEL JU made to the most possible extent use of the various Service Level Agreements (SLAs) already concluded with relevant Commission Services, as well as its private members and also made use of inter-institutional framework contracts (e.g. IT services and equipment, interim staff services, external audit services, office supplies, travel agency services, staff trainings).

Moreover, in 2019, ECSEL JU run several procurement procedures mainly for low-value contracts, as well as one open procedure. The vast majority of low value contracts were concluded in order to cover for services and supplies for the daily function of the office.

5.10.3.1 Major procurement procedures

- An open procedure for engaging a contractor to support the Symposium event in Bucharest in June 2019 was launched in 2018 and completed early in 2019. The contract was awarded to TMAB Business Events.

- In April 2019 an open procedure was launched for the award of a contract for a "Study on the impact of ECSEL funded actions. Further details can be found under "5.6 Call for tenders".

- In September 2019, ECSEL JU signed a contract of EUR 19,548.00 with Lange Research Aircraft GMBH for the organisation, preparation and performance of transportation and assembling of their glider at the European Research & Innovation Days 2019. Due to the specificities of the services needed, Lange Research Aircraft GMBH was the only contractor that could provide such service, therefore the competition was absent for technical reasons and the procedure selected was the negotiated procedure without prior publication of a contract notice.

5.10.4 IT and logistics

JUs co-located with ECSEL in the White Atrium building share the same IT infrastructure. The governance includes an ECSEL JU representative in the organisation in the joint IT steering committee. At present the shared ICT infrastructure is hosted by Cancom, except for the TESTA connection, which is hosted in the building's datacentre. ECSEL was planning to migrate its IT Infrastructure to Office 365, however due to major concerns regarding Data Protection, the project has been put on hold, pending approval from EDPS.

For the financial management and monitoring of projects as well as the calls management under Horizon 2020, ECSEL JU implements the common ICT tools designed, updated and maintained by the European Commission.

ECSEL JU is also using ABAC (accounting system of the European Commission) for its financial management related to procurement and FP7 transactions.

The business continuity plan and disaster recovery plan were established in 2015, providing guidance and establishing procedures in case of interruption of activities or unforeseen situations.

The plans were since tested and subject to review, including with other JUs and in 2019.

6 Part II. Management Report

6.1 GOVERNANCE

6.1.1 Governing Board

In 2019 the Governing Board was chaired by Sabine Herlitschka.

The vice-chairs of the Governing Board were:

- Ben Ruck, Chair of the Public Authorities Board, and as of November 2019 Doris Vierbauch
- Lucilla Sioli, Lead delegate of the Commission delegation in the Governing Board, and
- Jean-Luc di Paola-Galloni, Chair of the Private Members' Board.

In 2019 the Governing Board held four meetings, organised 11 written procedures and adopted 14 decisions (some still under completion). Meeting summaries and decisions adopted are available on the ECSEL JU website.

Decisions adopted:

number	title	date	status
GB 2019 118	1st Amendment Annual Work Plan 2019	28.01.2019	meeting 22
GB 2019 119	Appraisal ED	20.05.2019	WP 38
GB 2019 120	Nomination reporting officers	20.06.2019	WP 40
GB 2019 123	Appraisal ED, probationary and management trial period	29.10.2019	WP 45
GB 2019 124	Budget 2019 Amendment 1	01.07.2019	WP 41
GB 2019 125	ToR observers Call 2019	19.06.2019	WP 39
GB 2019 126	AAR 2018 & assessment by the GB	19.06.2019	meeting 23
GB 2019 127	Final Annual Accounts 2018	19.06.2019	
GB 2019 128	Amendment GB RoP	10.10.2019	WP 42
GB 2019 129	Access to projects results by EC services	17.10.2019	(WP 43 cancelled) WP 44
GB 2019 130	Budget 2019 Amendment 2	31.10.2019	WP 46
GB 2019 132	Work Plan 2020	26.11.2019	WP 47
GB 2019 133	Budget 2020	16.12.2019	
GB 2019 134	MASP 2020	26.11.2019	

Members of the Governing Board

Private Members:

Delegation	Name	First Name
AENEAS	Bedran	Caroline
	Bériot	José
	Bressler	Patrick
	Crippa	Danilo
	Muller	Sophie
	Doell	Gerhard
	Dupont-Nivet	Eric
	Geraets	Maurice
	Graignic	Fabrice
	Hellenthal	Berthold
	Herlitschka	Sabine
	Jarre	Alain
	Krijgsman	Arco
	Leroy	Pascal
	Mokrani	Hervé
	Roncales Poza	Miguel
	Roux	Laurent
	Sangiorgi	Enrico
	Sebastian	Ina
	van den Biesen	Jan
	Van den Bosch	Anne
	van Staa	Peter
	Wyon	Christophe
	Zandbergen	Peter

ARTEMIS-IA	Azzoni	Paolo
	Beetz	Klaus
	Bonecki	Mateusz
	Burtscher	Jean-Baptiste
	Candry	Patrick
	Delsing	Jerker
	di Paola Galloni	Jean-Luc
	Eckel	Andreas
	Garcia Sanchez	Jesus Angel
	Goia	Naiara
	Harris	Philip J.
	Herlitschka	Sabine
	Hufeld	Knut
	Leibbrandt	Wouter
	Lohstroh	Jan
	Niehaus	Juergen
	Paulweber	Michael
	Pistauer	Markus
	Pype	Patrick
	Rogo	Francesco
	Roning	Juha
	Ruiz	Pedro
	Schiara	Ugo
	ten Berg	Ad
	Uhrig	Sascha
	Uribeetxeberria	Roberto
	Van Baelen	Stefan
	van den Biesen	Jan
	Watzenig	Daniel
	Zafalon	Roberto

EPOSS	Carpanzano	Emanuele
	DalMolin	Renzo
	Donat	Albrecht
	Finkbeiner	Stefan
	Gessner	Wolfgang
	Groppo	Riccardo
	Herlitschka	Sabine
	Hoffmann	Karsten
	Korhonen	Anssi
	Lequepeys	Jean-René
	Merveille	Chris
	Moore	Eric
	Offenberg	Michael
	Otto	Thomas
	Rzepka	Sven
	Rödig	Herbert
	Storer	David
	van den Biesen	Jan
	Vigna	Benedetto

ECSEL Participating States:

Delegation	Name	First Name
AT	Hegny	Ingo
	Mosnik	Lisbeth
	Vierbauch	Doris
	Wiesmüller	**Michael**
BE	Deprez	Francis
	Maas	Stijn
	Sileghem	Maarten
	Van de Loock	**Leo**
BG	**Komatichev**	**Emil**
	Tomov	Kalin
CH	Buehler	Roland
	Gut	**Andreas**
CZ	**Vávra**	**Michal**
	Núñez Tayupanta	Lucie
DE	Jester	Sebastian
	Kaltschew	Julia
	Mengel	**Stefan**
	Rittner	Johannes
DK	**Hansen**	**Michael**
EE	Uska	Urmas
	Meressoo	**Toomas**
EL	Farmaki	Danae
	Zekentes	**Konstantinos**
ES	Serrano Agejas	Joaquin Angel
	Fernandez Garcia	Estrella
	Gómez Miguel	Beatriz
	Ginard Pariente	**David**
	Suarez Martín	Antonio Fernando
	Pelayo	Enrique
	Lucena Chacón	Rafael
FI	Ahola	Kimmo
	Heikki	**Uusi-Honko**
	Leino	Kari
FR	Capy	Loic
	Madigout	Geoffrey
	Piault	Clément
	Weill	**Mathieu**
HU	**Csuzdi**	**Szonja**
	Divinyi	Agnes
IE	**O'Reilly**	**Stephen**
IL	**Seker**	**Dan**
	Shaked	Nir
	Shalev	Nili
IT	**Covello**	**Aldo**
	Macii	Enrico
LV	**Alberts**	**Maris**
LU	**Grotz**	**Mario**
	Crean	Gabriel
MT	Cutajar	Omar John
	Foden	**James**
NL	Ruck	Ben
	Schaap	**Wilbert**
	van Roosmalen	Fred
NO	**Davis**	**Kim**
	Aune	Agnes
	Espeli	Tron
PL	Drewniak	Dariusz
	Wojciechowska-Grochola	**Barbara**
PT	Durão	Rui
	Coelho	Filipa
	Viseu Melo	**Luis Humberto**
RO	**Anania**	**Cristina**
	Dinu	Elena
	Hilgen	Sanda
	Gheorghian	Daniela
	State	Ruxandra
SE	Allström	Andrea
	Aurelius	Andrea
	Gustafsson	**Lars**
SK	**Donoval**	**Daniel**
TR	Bener	Ezgi
	Cetin	Utku
	Hasekioglu	**Orkun**
UK	**Hiles**	**Reagan**
	Musuamba	Kamany
	Launchbury	Elizabeth
	Papadakis	Georgios

European Commission:

Delegation	Name	First Name
European Commission	Delia	Sandro
	Ibañez Gallardo	Francisco
	Reis	Ines
	Lemke	Max
	Maloney	Colette
	Mendez Blanck Conrady	Enrique
	Rouhana	Khalil
	Sioli	**Lucilla**

6.1.2 Executive Director

Bert De Colvenaer was appointed Executive Director as from 1 January 2016 and was renewed in December 2018 for three years (as of 1 January 2019).

The Executive Director has adopted the following decisions:

number	title	date	status
ED 2019 231	Selection committee SNE	16.01.2019	e-doc
ED 2019 232	Role of JU staff within the calls (REPEAL ED 2018.178)	28.01.2019	e-doc
ED 2019 233	Guide for Applicants for Calls 2019 (REPEAL ED 2018.183)	28.01.2019	e-doc
ED 2019 234	Evaluation Forms for the Calls 2019 (REPEAL ED 2018.208)	28.01.2019	e-doc
ED 2019 235	Proposal Template Part B (Technical Annex) for IA and RIA–Calls 2019 (REPEAL ED 2018.181v1)	28.01.2019	e-doc
ED 2019 236	Additional requirements document for the CSA Health Call	28.01.2019	e-doc
ED 2019 237	Transfer 2019-01 Relating to Budget Transfers between Chapters within a Title	25.01.2019	e-doc
ED 2019 238	H2020 Workflow: Expert Contract (REPEAL ED 2018 193)	31.01.2019	e-doc
ED 2019 239	H2020 Workflow: Audit Report Implementation (AURI) (REPEAL ED 2018 194)	31.01.2019	e-doc
ED 2019 240	H2020 workflow: GAP workflow (REPEAL ED 2018 200)	31.01.2019	e-doc
ED 2019 241	H2020 workflow: Expert Payment Approval (REPEAL ED 2018 216)	31.01.2019	e-doc
ED 2019 242	H2020 workflow: Evaluation Result Letter Batch (REPEAL ED 2018 203.v1)	31.01.2019	e-doc
ED 2019 243	H2020 workflow: Amendment Consortium request (REPEAL ED 2018 213)	31.01.2019	e-doc
ED 2019 244	H2020 workflow: Amendment JU initiated (REPEAL ED 2018 214)	31.01.2019	e-doc
ED 2019 245	H2020 workflow: Reporting and Payments (REPEAL ED 2018 215)	31.01.2019	e-doc
ED 2019 246	H2020 workflow: Project Monitoring (REPEAL ED 2018 217)	31.01.2019	e-doc
ED 2019 247	H2020 workflow: GAP Termination (REPEAL ED 2017 141-d)	31.01.2019	e-doc
ED 2019 248	H2020 workflow: GAP Termination by Consortium (REPEAL ED 2017 141-e)	31.01.2019	e-doc
ED 2019 249	H2020 workflow: Reviews' expert pool approval	31.01.2019	e-doc
ED 2019 250	H2020 workflow: Evaluation expert pool approval (REPEAL ED 2018 201)	31.01.2019	e-doc
ED 2019 251	H2020 workflow: Grant Ethics	31.01.2019	e-doc
ED 2019 252	H2020 workflow: Project handover	31.01.2019	e-doc
ED 2019 253	H2020 workflow: Inbound formal notification	31.01.2019	e-doc
ED 2019 254	H2020 workflow: FINA	31.01.2019	e-doc
ED 2019 255	Amendment to work plan 2019	13.02.2019	e-doc
ED 2019 256	Guideline for the organisation of reviews	15.02.2019	e-doc
ED 2019 257	H2020 reporting and payment procedure–REPA (repealing ED 2017 149)	07.05.2019	e-doc
ED 2019 257. v1	H2020 reporting and payment procedure–REPA (repealing ED 2017 149)–without Annexes 1, 2 and 3	23.05.2019	e-doc
ED 2019 258	Amendment to work plan 2019 through ED Decision (V4)	06.03.2019	e-doc
ED 2019 259	Granting an exception to JU Grant Agreements for CSAs	25.03.2019	e-doc
ED 2019 260	Extension FDI	15.03.2019	e-doc
ED 2019 261	Allocations of Experts for the CSA Call 2019	29.03.2019	e-doc
ED 2019 262	AOD delegation Olivier Lambinet 08.04–12.04.2018	05.04.2019	e-doc
ED 2019 263	Amendment to work plan 2019 through ED Decision (V5)	24.04.2019	e-doc
ED 2019 264	Allocation of the proposals to the experts for the evaluation PO phase of the ECSEL Calls 2019-1-IA & 2019-2-RIA	15.05.2019	e-doc
ED 2019 264. v1	Allocation of the proposals to the experts for the evaluation PO phase of the ECSEL Calls 2019-1-IA & 2019-2-RIA	29.05.2019	e-doc
ED 2019 265	Administrative Agreement Luxembourg	24.06.2019	e-doc
ED 2019 266	Joint Reclassification Committee for the year 2019	25.06.2019	e-doc
ED 2019 267	End of project certificate H2020	24.06.2019	e-doc
ED 2019 268	Amendment to work plan 2019 through ED Decision (V6)	15.06.2019	e-doc
ED 2019 269	AOD delegation YGI weeks 08 July and 15 July 2019	25.06.2019	e-doc
ED 2019 270	Transfer 2019-02 Relating to Budget Transfers between Chapters within a Title	17.07.2019	e-doc
ED 2019 271	Reclassification of staff for the year 2019	29.07.2019	e-doc
ED 2019 272	Transfer 2019-03 relating to a budget transfer between Titles	25.07.2019	e-doc

ED 2019 273	AOD delegation YGI weeks 05 August and 12 August 2019	29.07.2019	e-doc
ED 2019 274	H2020 workflow: Project Monitoring (REPEAL ED 2019 246)	22.08.2019	e-doc
ED 2019 275	AOD delegation OLA weeks 26 August and 30 August 2019	23.08.2019	e-doc
ED 2019 276	ECSEL Privacy Policies	25.09.2019	e-doc
ED 2019 277	Transfer 2019-04 Relating to Budget Transfers between Chapters within a Title	11.09.2019	e-doc
ED 2019 278	Allocation of the proposals to the experts for the evaluation FPP phase of the ECSEL Calls 2019-1-IA & 2019-2-RIA	25.09.2019	e-doc
ED 2019 278. v1	Allocation of the proposals to the experts for the evaluation FPP phase of the ECSEL Calls 2019-1-IA & 2019-2-RIA	10.10.2019	e-doc
ED 2019 279	AOD delegation OLA between 21 October and 1st November 2019	17.10.2019	e-doc
ED 2019 280	Transfer 2019-05 relating to budget transfers between chapters and titles	20.12.2019	e-doc

6.1.3 Public Authorities Board

In 2019 the Public Authorities Board was chaired by Ben Ruck. The vice-chair was Kari Leino.

The mandate of the new Public Authorities Board Chair, Doris Vierbauch, started at the end of the meeting on 25th November 2019.

In 2019 the Public Authorities Board held 5 meetings, organised 3 written procedures and adopted 7 decisions. Meeting summaries and decisions adopted are available on ECSEL JU website.

Decisions adopted:

number	title	date
PAB 2019 41	Launch Call 2019	30.01.2019
PAB 2019 42	Amendment Funding decision ECSEL Call 2018-1 IA	06.05.2019
PAB 2019 43	Amendment Funding decision ECSEL Call 2018-2 RIA	06.05.2019
PAB 2019 44	Funding decision ECSEL Call 2019-3	15.05.2019
PAB 2019 45	Procedure for the election of the Chairperson	28.10.2019
PAB 2019 46	Funding decision ECSEL Call 2019-1	26.11.2019
PAB 2019 47	Funding decision ECSEL Call 2019-2	26.11.2019

Delegates to the Public Authorities Board:

Delegation	Name	First Name
AT	**Almansa**	**Ana**
	Niklfeld	Georg
	Vierbauch	Doris
	Wiesmüller	Michael
BE	Deprez	Francis
	Maas	Stijn
	Sileghem	Maarten
	Van de Loock	**Leo**
BG	**Komatichev**	**Emil**
	Tomov	Kalin
European Commission	Delia	Sandro
	Ibañez Gallardo	Francisco
	Lemke	Max
	Maloney	Colette
	Mendez Blanck Conrady	Enrique
	Rouhana	Khalil
	Sioli	**Lucilla**
CH	**Buehler**	**Roland**
	Gut	Andreas
CZ	**Vávra**	**Michal**
	Núñez Tayupanta	Lucie
DE	Kaltschew	Julia
	Jester	Sebastian
	Mengel	**Stefan**
	Pötschke	Konstantin
	Rittner	Johannes

DK	**Hansen**	**Michael**
EE	**Uska**	**Urmas**
	Meressoo	Toomas
EL	Farmaki	Danae
	Pappa	**Aliki**
ES	Serrano Agejas	Joaquin Angel
	Fernandez Garcia	Estrella
	Gómez Miguel	Beatriz
	Ginard Pariente	**David**
	Suarez Martín	Antonio Fernando
	Pelayo	Enrique
	Lucena Chacón	Rafael
FI	**Ahola**	**Kimmo**
	Heikki	Uusi-Honko
	Leino	Kari
FR	Capy	Loic
	Madigout	Geoffrey
	Piault	**Clément**
HU	Csuzdi	Szonja
	Divinyi	**Agnes**
IE	**O'Reilly**	**Stephen**
IL	**Seker**	**Dan**
	Shaked	Nir
	Shalev	Nili
IT	**Covello**	**Aldo**
	Macii	Enrico
LV	Alberts	Maris
	Asmuss	Julija
	Levandelis	Egons
	Pliksa	**Ineta**
LU	**Grotz**	**Mario**
	Crean	Gabriel
MT	Cutajar	Omar John
	Foden	**James**
NL	Ruck	Ben
	Schaap	**Wilbert**
	van der Bijl	Robert-Jaap
	van Roosmalen	Fred
NO	**Davis**	**Kim**
	Aune	Agnes
	Espeli	Tron

PL	Maciejko	Krystyna
	Ratajczak	**Agnieszka**
PT	Durão	Rui
	Coelho	Filipa
	Viseu Melo	**Luis Humberto**
RO	**Anania**	**Cristina**
	Dinu	Elena
	Hilgen	Sanda
	Gheorghian	Daniela
	State	Ruxandra
SE	Allström	Andrea
	Aurelius	Andrea
	Engström	Julia
	Gustafsson	Lars
	Saavedra Granholm	**Adela**
SK	**Donoval**	**Daniel**
TR	**Bener**	**Ezgi**
	Cetin	Utku
	Hasekioglu	Okrun
UK	Hiles	Reagan
	Musuamba	Kamany
	Papadakis	**Georgios**

6.1.4 Private Members Board

The Private Members Board has a rotating Chair: In 2019, the position was held by Jean-Luc di Paola-Galloni of ARTEMIS-IA.

In 2019 members of the Private Members Board of the ECSEL JU were:

From AENEAS:

- Caroline Bedran
- Ina Sebastian
- Peter Zandbergen

From ARTEMIS-IA:

- Jan Lohstroh
- Jean-Luc di Paola-Galloni
- Michael Paulweber

From EPoSS:

- Wolfgang Gessner
- Michael Offenberg
- Renzo DalMolin

6.2 Major Developments

In 2019, the relevant Rules of Procedure required that the Chairperson of both PAB and GB be re-elected. After due process, Dr. Sabine Herlitschka was re-elected as Chair of the Governing Board, and Ms. Doris Vierbauch (AT) was elected as Chair of the PAB (and consequently vice-chair for the PAB in the Governing Board), replacing Ben Ruck (NL), who had previously held that position.

6.3 Budgetary and financial management

ECSEL JU Governing Board approved the initial annual budget for year 2019 on 13 December 2018 by ECSEL GB Decision 2018.115.

On 1 July 2019, the ECSEL JU Governing Board adopted GB Decision 2019.124 amending for the first time the initially adopted budget in order to increase the appropriations for payments for running costs under Titles 1 and 2 by reactivating the unused appropriations deriving from the year 2018 which corresponded to payments due in 2019 under commitments entered in 2018. Moreover, the first amendment served for the adjustment of needs in payment appropriations regarding the execution of payments related to FP7 projects under Title 3 reducing EC contribution and at the same time increasing the amount of unused payment appropriations from previous years.

A second budget amendment was adopted by ECSEL JU Governing Board (GB Decision 2019.130) on 31 October 2019. The second amending budget introduced the reactivation of unused commitment and payment appropriations from the previous budget exercise under Titles 1, 2 and 3 as foreseen in article 6.5 of ECSEL Financial Rules.

Overall, in 2019, the total available appropriations (including, in addition to the budget voted, appropriations carried over from the previous year, budget amendments as well as miscellaneous payment appropriations for the period (e.g. internal and external assigned revenue)) were EUR 203,965,889. 08 for commitments and EUR 232,544,947. 98 for payments. The budget implementation reached 99.79% in terms of commitment appropriations and 80.46% in terms of payment appropriations. As of 2019, all ECSEL budget lines are dissociated, including administrative budget lines. Moreover, in 2019 for the first time ECSEL JU made use of the mechanism of reactivation of unused appropriations from previous budget exercises for the administrative budget as well as per article 6.5 of ECSEL Financial Rules.

Administrative expenditure (Title 1 – Staff and Title 2 – Running Costs)

Under Title 1, the ECSEL budget execution reached 99.93% in terms of commitment appropriations and 98.17% in terms of payment appropriations. This title was mainly used for salaries of the JU staff, as well as staff missions and trainings.

Under Title 2, the execution reached 100% in terms of commitment appropriations and 80.46% in terms of payment appropriations. Even if the execution rate in payment appropriations has been increased compared to the previous years, still an important number of administrative payments shall become due only in the coming years.

In addition to the budget amendments, the Executive Director, in accordance with Article 10 of the ECSEL Financial Rules, had transferred appropriations between Title 1 and 2, as well as between chapters within the same Title in the course of the year. These transfers had the objective to allocate better the resources needed for the running costs. Overall, budget transfers had no impact on the approved budget.

Operational expenditure (Title 3 – Selected projects after annual calls)

Under Title 3, the ECSEL JU budget covers the operational expenditure related to the implementation of projects under the 7th Framework Programme (FP7), as well as under the Horizon 2020 Programme (H2020).

Under H2020, the budget implementation in terms of commitment appropriations reached 99.97%, whereas the implementation in terms of payment appropriations reached 88.77%. The major part of the payment appropriations was used for the pre-financing of the grants resulting from the 2018 calls for proposals, while the minor part was used for interim and final payments for the grants resulting from previous ECSEL calls for proposals.

Under FP7, the budget implementation in payment appropriations reached 45.32% reflecting the important delays in receiving the end of project certificates from national authorities.

6.3.1 Financial Regulation

Article 71 of the general Financial Regulation provides for the adoption of a delegated act pursuant to Article 290 of the Treaty on the Functioning of the European Union on a Model Financial Regulation for public-private partnership bodies which shall lay down the principles necessary to ensure sound financial management of EU funds and which shall be based on Article 154 of the general Financial Regulation.

6.3.2 Currency

ECSEL JU's accounts are kept in Euro.

6.3.3 Management Information System

For management information purposes ECSEL JU uses ABAC Workflow for budgetary accounting and SAP for general ledger accounting. Both systems are managed and maintained by the European Commission.

For the management of grants under the H2020 programme ECSEL JU uses the IT tools developed by the European Commission (Common Implementation Centre).

6.4 Human Resources

The ECSEL JU did not proceed to any new recruitment during 2019, as all establishment posts were filled. A recruitment procedure for a seconded national expert was launched, however it was concluded without result (after extension of the call period, three candidates were interviewed and one selected, who later turned down the resulting offer). Substantial work was devoted to preparing the update of implementing rules of the Staff Regulations, such effort being set to complete in Q1 of 2020.

6.5 Follow –up on Audits and Evaluations

The following paragraphs contain an overview of audit and evaluation actions and their follow up during 2019.

6.5.1 Internal Audit Service (IAS)

The Internal Audit Service performed in the last quarter of 2019 a follow-up of audit recommendations in ECSEL JU. The objective of the engagement was to assess the progress made in implementing the open recommendations that resulted from past IAS audits. Based on the results of the follow-up audit, the IAS concluded that all recommendations raised during the Audit: (CSC at the time of the audit, now known as Common Implementation Centre) coordination with the Common Support Centre and implementation of CSC tools and services had been effectively implemented. For the audit on performance management of ECSEL JU activities, there were two recommendations followed up by IAS. The recommendation on performance indicators and monitoring tools has been effectively implemented. The important recommendation on the performance framework has been partially implemented and therefore remains open. This recommendation was downgraded from "very important" to "important" in a previous follow-up note, as the follow-up actions were partially implemented.

6.5.2 Internal Audit Capability (IAC)

Based on Council Regulation (EU) No 561/2014 of 6 May 2014 establishing the ECSEL Joint Undertaking, having regard to Article 28 of the financial rules of ECSEL JU and as adopted by the Governing Board decision (ECSEL GB-2014.15) the JU established an Internal Audit Capability (IAC) which provides independent, objective assurance and consulting services designed to add value and improve the operations of the JU.

Within ECSEL JU, the internal audit capability is performed by the Internal Control and Audit Manager (ICAM).

During 2019, the main activities of the ICAM focused on coordinating the implementation and follow-up of the audits carried out by the internal auditor of ECSEL JU (IAS), European Court of Auditors and the external auditors. Further, as every year, the objective established for the IAC is to provide the Executive Director with assurance as to the effectiveness and efficiency of risk management, control and governance process in the ECSEL JU.

6.5.3 European Court of Auditors (ECA)

In 2019, the ECSEL JU continued to assist the Court of Auditors during their missions carried out during the year. ECSEL JU followed up the findings raised by the Court by implementing actions that improve the procedures and internal controls of the JU.

The audit on the accounts of the ECSEL JU and on the legality and regularity of the payments and revenue underlying the 2019 annual accounts is ongoing. A first mission of the Court of Auditors took place in December 2019. The annual accounts are audited by an external audit company (contracted through a DG Budget framework contract).

For the financial year ended 31 December 2018, the European Court of Auditors issued an unqualified ("clean") audit opinion on the accounts of ECSEL JU and on the legality and regularity of the payments and revenue underlying the 2018 annual accounts.

6.5.4 Follow up on discharge

The discharge in respect of the implementation of the budget of the ECSEL JU for the financial year 2018 is ongoing. The timeline of the annual discharge procedure foresees that by end March n+2 the adoption of the European Parliament (EP) reports in the Plenary session. The EP decides whether to grant or postpone discharge.

6.5.5 Evaluations

As required by the Council Regulation setting up the ECSEL Joint Undertaking, in 2017 the Commission performed the final evaluation of the JU´s performance under FP7 and mid-term evaluation of its performance under Horizon 2020. In response to the recommendations of the interim evaluation of the ECSEL Joint Undertaking (2014-2016) and in particular the final report prepared for the European Commission in June 2017, ECSEL´s Governing Board prepared an action plan presenting responses to each of the recommendations.

6.6 Environment management

A "Go-green group" has been created for all JU's. The aim is to compile environmental initiatives and ideas that we can implement in the different JU's.

7 Part III. Internal Control

The implementation and effectiveness of the internal control system is performed by the Internal auditor, by the Internal Audit Capability and by the management of the ECSEL JU. At this point in time, most controls are implemented and are assessed as functioning effectively. The Internal Control and Audit Manager returned to her functions in Q3 2019.

7.1 Compliance and effectiveness of Internal Control

The internal control framework is provided by the Governing Board Decision (GB-2014.15) adopting the internal control standards for effective management. Since then, the internal control system of the JU has been governed by internal control standards (ICSs), which were based on the standards for effective management established by the Commission.

During the last quarter of 2019, the Internal Audit Capability performed a self-assessment on the implementation of its ICSs. The overall objective of the exercise was to have an updated overview of the state of implementation of the ICSs.

As abovementioned, most controls are implemented and are assessed as functioning effectively.

7.2 INTERNAL CONTROL FRAMEWORK (elements supporting assurance)

7.2.1 Financial Procedures

The Financial Rules have been adopted by the Governing Board on 10 October 2016 (Decision ECSEL GB-2016.67). The Financial Circuits were updated in 2018.

7.2.2 Ex-ante Controls on Operational Expenditure

Again in 2019, the ECSEL JU has been operating under two different regimes:

- For the legacy of projects initiated under FP7 implementing the regulations and rules defined under the ARTEMIS and ENIAC Joint Undertakings, and along the terms of the administrative agreements signed with the participating states: control on operational expenditures of ARTEMIS/ENIAC legacy projects continues to be entrusted to the national Funding Authorities that certify the eligible costs and the amounts paid as national contributions, so that the JU can calculate its contribution following the national pace of payment.

- For the implementation of projects selected under H2020, in accordance with the H2020 common rules, and as defined in the new administrative agreements signed with Participating States: ex-ante control of operational expenditure is implemented using the tools and methods developed by the European Commission.

7.2.3 Ex-post Control of Operational Expenditure and Error Rates Identified

The operational expenditure of the ECSEL JU in 2019 can be split into 2 main parts: FP7 legacy payments (20,305,795.89 €) and Horizon 2020 operational payments (161,682,896.14 €, which includes prepayments and actual intermediate and final payments for projects and pre-financing of an impact study: 180,900 €).

With regard to the FP7 legacy actions selected for funding by ARTEMIS JU and ENIAC JU, a continuous series of activities took place, in accordance with the rules defined under the legal framework of the ARTEMIS and ENIAC Joint Undertakings.

In 2014 and 2015, the ECSEL Joint Undertaking assessed the implementation of ex-post audits by the National Funding Authorities (NFAs). However, the significant variation in the methodologies and procedures used by the NFAs does not allow the ECSEL Joint Undertaking to calculate a single reliable weighted error rate or a residual error rate. Complementary to this, for the national expenditures for 2015, 2016, 2017 and 2018 written statements were obtained from the NFAs declaring that the implementation of their national procedures provides reasonable assurance on the legality and regularity of transactions.

As every year, at the end of year 2019 ECSEL JU has invited the NFAs to issue a declaration of assurance for the audits performed under their responsibilities under FP7 regarding the 2018 activities.

The declarations received until the end of January 2020, provide the JU with a rate of assurance reaching 99.44 % of the total of transactions concerned.

Total NFAs	21
Total declarations received	18
Response % by NFA	85.71%
Response % by payments	99.44%

Table 24: Summary of ex-post audit declarations received

The same procedure will be followed for the 2019 expenditure and a similar financial coverage is expected.

Under the coordination of the Common Implementation Centre of the European Commission, and of its Common Audit Service, ECSEL JU has been cooperating with the other stakeholders of the H2020 research family on the implementation of the H2020 ex-post audit strategy.

The main objective of the Ex-post Audit Strategy is to provide the individual Authorising Officers with the necessary elements of assurance in a timely manner, thus allowing them to report on the budget expenditure for which they are responsible. Ex-post controls on operational expenditure contribute in particular to:

- assessing the legality and regularity of expenditure on a multi-annual basis;
- providing an indication of the effectiveness of the related ex-ante controls;
- providing the basis for corrective and recovery mechanisms, if necessary.

The Representative Error Rate for ECSEL JU for H2020 in year 2019 is 3% and the Residual Error Rate is 1.48%, staying below the targeted threshold of 2%. This calculation is based on EU contribution paid to beneficiaries in H2020.

The European Court of Auditors in its 2018 Annual Report and as a result of its review of the Commission's ex-post audits observed (among others) that the Commission methodology for the calculation of the error rate leads to an understatement of the error rate the extent of which cannot be quantified. As a result, it introduced recommendation 5.3, accepted by the Commission, to address this and other observations made in the context of the above-mentioned review.

7.2.4 Audit of the European Court of Auditors

For the financial year ended 31 December 2018, the European Court of Auditors issued an unqualified ("clean") audit opinion on the accounts of ECSEL JU and on the legality and regularity of the payments and revenue underlying the 2018 annual accounts. For the first time, the Court of Auditors gave an unqualified audit opinion on the legality and regularity of payments underlying the 2018 accounts for ECSEL, as the share of FP7 payments was at a low level and the Court of Auditors had reasonable assurance that the error rate for ECSEL´s total 2018 payments was below the materiality threshold of 2%.

7.2.5 Internal Audit

The Internal Audit Service of the European Commission performs the role of Internal Auditor of the ECSEL JU. Following the IAS Strategic Internal Audit Plan 2019-2021 for ECSEL JU, during 2019 the audit on Horizon 2020 grant agreement implementation and closing in the ECSEL JU was launched and it is ongoing. The objective of this audit is to assess the adequacy of the design and the efficiency and effectiveness of the internal controls in place in the ECSEL JU for the implementation and closing of grant agreements under the H2020 programme. The first stage of the H2020 grant management lifecycle was audited in 2016.

7.2.6 Risk management

Risk Management is one of the key elements in an effective internal control framework. ECSEL JU systematically analyses the risks in relation to its main activities at least once a year, develop action plans to address them and assign staff responsible for implementing those plans.

A risk is defined as "any event or issue that could occur and adversely impact the achievement of the ECSEL JU´s, strategic and operational objectives. Lost opportunities are also considered as risks". Hence, risks relate to the non-achievement of objectives.

At JU level, a risk register documents the most significant risks and provides a record of risks and measures taken to manage them. The ECSEL JU management performed an annual risk assessment complementary to the work performed by the Internal Auditor.

In July 2019, the IAS released the IAS Strategic Internal Audit Plan 2019-2021 which is based on the results of an in-depth risk assessment carried out by the IAS in November 2018. The IAS in-depth risk assessment was conducted in conformance with the International Standards for the Professional Practice of Internal Auditing.

Data protection

European Regulation (EU) N°2018/1725 of the European Parliament and of the Council of 23 October 2018 on the protection of natural persons with regard to the processing of personal data by the Union institutions, bodies, offices and agencies on the free movement of such data ("EUI-GDPR") has been implemented by ECSEL JU with the support of an external contractor.

This has resulted in a complete review of the protection of personal data by the Joint Undertaking's staff and an update of the general privacy policy. Specific privacy policies have been drafted to cover the specific following fields: applicants

privacy policy in the context of selection and recruitment, access to documents, events, external experts, grant management and procurement procedures.

The JU staff has received tailored training regarding the main characteristics of the GDPR, on how to ensure compliance, avoid data breaches and refer to the data protection officer for any issue involving personal data.

Conflict of interest

In 2019, the ECSEL JU continued to apply the Governing Board Decision on the rules on the prevention and management of conflicts of interest (ECSEL GB-2015.41). It addresses all actors involved in the Joint Undertaking activities, including staff, PAB and GB members, experts involved in projects reviews and evaluations, participants in procurement and recruitment committees.

8 Part IV. Declaration of Assurance

Assessment of the Annual Activity Report by the Governing Board (moved to first chapter: the CAAR template is not consistent on this)

8.1 Reservations

The ECSEL JU management does not see at this point any reason to express a reservation.

8.2 Elements supporting assurance

The ECSEL JU management has reasonable assurance that the resources assigned to the activities described in this report have been used for their intended purpose and in accordance with the principles of sound financial management, and that the control procedures put in place give the necessary guarantees concerning the legality and regularity of the underlying transactions.

This reasonable assurance is based on:

- the own judgement and the information at its disposal resulting from the management supervision activities,
- the results of the self-assessment,
- the assessment of the ex-post controls and the estimation of the residual error rate below the materiality level of 2 %,
- the Declarations of Assurance received from the National Funding Authorities (NFAs) on the audits performed in their field of competence,
- the work done by the Common support service of the Commission for the implementation of the overall strategy for ex post audits for the programme H 2020,
- the work of the Internal Audit Capability,
- the observations of the Internal Audit Service,
- The lessons learnt from the reports of the Court of Auditors for previous years,
- The observations of the European Parliament in the discharge procedures for previous years

8.3 DECLARATION OF ASSURANCE

I, the undersigned, Bert De Colvenaer, Executive Director of the ECSEL JU, In my capacity as authorising officer

Declare that the information contained in this report gives a true and fair view.

State that I have reasonable assurance that the resources assigned to the activities described in this report have been used for their intended purpose and in accordance with the principles of sound financial management, and that the control procedures put in place give the necessary guarantees concerning the legality and regularity of the underlying transactions.

This reasonable assurance is based on my own judgement and on the information at my disposal, such as the results of the self-assessment, ex-post controls, the work of the internal audit capability, the observations of the Internal Audit Service and the lessons learnt from the reports of the Court of Auditors and from the observations of the European Parliament for years prior to the year of this declaration.

Confirm that I am not aware of anything not reported here which could harm the interests of the Joint Undertaking.

Brussels, 10 June 2020

Bert De Colvenaer
ECSEL JU Executive Director

9 Annexes

9.1 Annex I. Core business statistics

9.1.1 Projects execution-evolution by Call

FP7: Payments for ARTEMIS and ENIAC projects (euro)

			Payements per year							
	CALL	Committed amount	2014	2015	2016	2017	2018	2019	Total Paid	RAL on 31/12/2019
ARTEMIS	CALL 2008	4,034,679.07	280,243.96	1,081,126.07	802,231.16				2,163,601.19	
	CALL 2009	12,849,193.74	1,302,683.53	2,685,737.36	1,698,419.02	2,815,240.68			8,502,080.59	
	CALL 2010	12,772,004.72	1,155,401.36	2,976,491.18	2,769,616.42	1,878,611.47	1,220,856.65		10,000,977.08	
	CALL 2011	14,062,938.05	1,808,702.73	3,713,553.03	2,388,113.72	2,583,930.30	1,165,692.27	419,918.73	12,079,910.78	327,861.30
	CALL 2012	30,425,294.78	2,293,448.82	6,982,947.67	4,539,836.31	5,133,905.54	2,543,885.30	905,805.03	22,399,828.67	7,995,241.35
	CALL 2013	27,281,037.42	418,759.63	10,034,566.17	5,203,344.51	3,582,331.82	3,119,641.52	857,127.99	23,215,771.64	4,065,265.78
	Total ARTEMIS	**101,425,147.78**	**7,259,240.03**	**27,474,421.48**	**17,401,561.14**	**15,994,019.81**	**8,050,075.74**	**2,182,851.75**	**78,362,169.95**	**12,388,368.43**
		Paid cumulative	**7,259,240.03**	**34,733,661.51**	**52,135,222.65**	**68,129,242.46**	**76,179,318.20**	**78,362,169.95**		
ENIAC	CALL 2008	4,617,829.52	1,914,942.65	354,885.63	1,145,703.58	107,464.52			3,522,996.38	
	CALL 2009	15,473,834.85	1,299,769.46	4,065,850.58	2,616,185.43	3,908,038.32			11,889,843.79	
	CALL 2010	14,068,799.38	1,323,859.98	3,439,760.42	1,684,592.15	4,488,117.85	269,225.30		11,205,555.70	
	CALL 2011	28,189,910.63	4,661,674.92	6,148,293.91	5,428,737.50	4,070,457.53	4,988,582.54	365,585.83	25,663,332.23	181,751.81
	CALL 2012	113,561,199.85	4,608,105.82	21,690,590.65	47,363,934.40	10,853,858.20	9,350,749.46	2,872,126.09	96,739,364.62	16,592,343.31
	CALL 2013	170,005,349.79	2,847,650.41	28,948,765.68	42,695,264.98	37,131,851.65	18,588,414.89	14,885,232.22	145,097,179.83	23,884,872.83
	Total ENIAC	**345,916,924.02**	**16,656,003.24**	**64,648,146.87**	**100,934,418.04**	**60,559,788.07**	**33,196,972.19**	**18,122,944.14**	**294,118,272.55**	**40,658,967.95**
		Paid cumulative	**16,656,003.24**	**81,304,150.11**	**182,238,568.15**	**242,798,356.22**	**275,995,328.41**	**294,118,272.55**		
	Total FP7	**447,342,071.80**	**23,915,243.27**	**92,122,568.35**	**118,335,979.18**	**76,553,807.88**	**41,247,047.93**	**20,305,795.89**	**372,480,442.50**	**53,047,336.38**
		Paid cumulative	**23,915,243.27**	**116,037,811.62**	**234,373,790.80**	**310,927,598.68**	**352,174,646.61**	**372,480,442.50**		

Notes:

"Committed amount" and "Payments for 2014" reflect amounts as of the establishment of ECSEL JU. "RAL on 31/12/2019" reflects the amount after payments and decommitments for projects closed up to 31/12/2019.

The figures are those related to the provisional accounts and not yet audited by the Court of Auditors.

Source: ABAC DWH

H2020 Payments for H2020 ECSEL Projects (euro)

	COMMITMENTS			PAYMENTS					
CALL	Initial Committed amount	De-committed amount	"RAL on 31/12/2019"	2015	2016	2017	2018	2019	"Total Paid 2014-2019"
Calls 2014	154,456,261.42	-9,928,989.31	4,919,745.90	55,690,901.06	40,332,205.81	30,379,684.28	4,056,432.94	9,148,302.12	139,607,526.21
Calls 2015	142,243,005.44	-500,045.00	12,247,429.22	0.00	58,683,961.96	37,571,933.96	26,200,278.00	7,039,357.30	129,495,531.22
Calls 2016	163,634,631.98	0.00	30,581,536.52	0.00	0.00	91,089,642.86	28,628,217.56	13,335,235.04	133,053,095.46
Calls 2017	170,067,212.88	0.00	58,074,449.23	0.00	0.00	0.00	87,613,851.34	24,378,912.31	111,992,763.65
Calls 2018	201,901,367.04	-130.63	93,900,986.04	0.00	0.00	0.00	799,644.00	107,200,606.37	108,000,250.37
Calls 2019	499,478.75	0.00	99,895.75	0.00	0.00	0.00	0.00	399,583.00	399,583.00
Total	**832,801,957.51**	**-10,429,164.94**	**199,824,042.66**	**55,690,901.06**	**99,016,167.77**	**159,041,261.10**	**147,298,423.84**	**161,501,996.14**	**622,548,749.91**

Notes:

"RAL on 31/12/2019" reflects the amount after payments and decommitments executed up to 31/12/2019.

Amounts in 2018 and 2019 do not include payments for studies (by public procurement) EUR 14,500.00 in 2018 and EUR 180,900.00 in 2019.

The figures are those related to the provisional accounts and not yet audited by the Court of Auditors.

Source: ABAC DWH

9.1.2 Scoreboard of H2020 common KPIs

	Correspondence to general Annex 1	Key Performance Indicator	Definition/Responding to question	Type of data required
INDUSTRIAL LEADERSHIP	12	SME–Share of participating SMEs introducing innovations new to the company or the market (covering the period of the project plus three years);		Number of SMEs that have introduced innovations;
	13	SME–Growth and job creation in participating SMEs	Turnover of company, number of employees	Turnover of company, number of employees;
SOCIETAL CHALLENGES	14	Publications in peer-reviewed high impact journals		Publications from relevant funded projects (DOI: Digital Object Identifiers); Journal impact benchmark (ranking) data to be collected by commercially available bibliometric databases.
	15	Patent applications and patents awarded in the area of the JTI	Number of patent applications by theme; Number of awarded patents by theme	Patent application number
	16	Number of prototypes testing activities and clinical trials	Number of prototypes, testing (feasibility/demo) activities, clinical trials	Reports on prototypes, and testing activities, clinical trials
	17	Number of joint public-private publications in projects	Number and share of joint public-private publications out of all relevant publications.	Properly flagged publications data (DOI) from relevant funded projects
	18*	New products, processes, and methods launched into the market	Number of projects with new innovative products, processes, and methods,	Project count and drop down list allowing to choose the type processes, products, methods
EVALUATION	NA	Time to inform (TTI) all applicants of the outcome of the evaluation of their application from the final date for submission of completed proposals	To provide applicants with high quality and timely evaluation results and feedback after each evaluation step by implementing and monitoring a high scientific level peer reviewed process	Number and % of information letters sent to applicants within target Average TTI (calendar days) Maximum TTI (calendar days)
	NA	Redress after evaluations	To provide applicants with high quality and timely evaluation results and feedback after each evaluation step by implementing and monitoring a high scientific level peer reviewed process	Number of redresses requested
GRANTS	NA	Time to grant (TTG) measured (average) from call deadline to signature of grants	To minimise the duration of the granting process aiming at ensuring a prompt implementationof the Grant Agreements through a simple and transparent grant preparation process	Number and % of grants signed within target Average TTG in calendar days Maximum TTG in calendar days
	NA	Time to sign (TTS) grant agreements from the date of informing successful applicants (information letters)		Number and % of grants signed within target Average TTG in calendar days Maximum TTG in calendar days
PAYMENTS	NA	Time to pay (TTP) (% made on time) -pre-financing - interim payment -final payment	To optimize the payments circuits, both operational and administrative, including payments to experts	Average number of days for Grants pre-financing, interim payments and final payments; Average number of days for administrative payments; Number of experts appointed
HR	NA	Vacancy rate (%)		% of post filled in, composition of the JU staff 11
JU EFFICIENCY	NA	Budget implementation/execution: % CA to total budget % PA to total budget	realistic yearly budget proposal, possibility to monitor and report on its execution, both in commitment (CA) and payments (PA), in line with sound financial management principle	% of CA and PA
	NA	Administrative Budget: Number and % of total of late payments	realistic yearly budget proposal, possibility to monitor and report on its execution in line with sound financial management principle	Number of delayed payments % of delayed payments (of the total)

9. (based on Annex II to Council Decision 2013/743/EU)
10. Clinical trials are IMI specific
11. Additional indicators can be proposed/discussed with R.1 and/or DG HR

NOTES: 18* This indicator is not a legally compulsory one, but it covers several additional specific indicators requested for more societal challenges by the services in charge.

Data to be provided by	Baseline at the start of H2020 (latest available)	Target at the end of H2020	Result
H2020 beneficiaries through project reporting	n.a. [new approach under H2020]	Not available to us	131 SMEs introduced innovation from the 464 participating SMEs in the years 2014 to 2017. 2018 not included as the projets of 2018 were signed in 2019. The share equals : 28%
H2020 beneficiaries through project reporting	n.a. [new approach under H2020]	Not available to us	Information not yet available
H2020 beneficiaries through project reporting; Responsible Directorate/Service (via access to appropriate bibliometric databases)	n.a. [new approach under H2020]	[On average, 20 publications per €10 million funding (for all societal challenges)]	1730 (Table 24). This covers the projects reviewed and finished,
H2020 beneficiaries through project reporting; Responsible Directorate/Service (via worldwide search engines such as ESPACENET, WOPI)	n.a. [new approach under H2020]	On average, 2 per €10 million funding (2014–2020) RTD A6	166 (Table 24) This covers the projects reviewed and finished
H2020 beneficiaries through project reporting	n.a. [new approach under H2020]	[To be developed on the basis of first Horizon 2020 results]	1421 (Table 24). This covers the projects reviewed and finished,
H2020 beneficiaries through project reporting; Responsible Directorate/Service (via DOI and manual data input-flags)	n.a. [new approach under H2020]	[To be developed on the basis of first Horizon 2020 results]	Not available
H2020 beneficiaries through project reporting	n.a. [new approach under H2020]	[To be developed on the basis of first Horizon 2020 results]	29 projects (Table 24). This covers the projects reviewed and finished,
Joint Undertaking	71	52 calendar days	All submitted projects 0% 71 calendar days 71 calendar days
Joint Undertaking	FP7 latest known results?		No request for redress
Joint Undertaking	n.a. [new approach under H2020]	TTG < 270 days (as %of GAs signed)	For projects in Call 2018: 13 proposals, 92%, 242 calendar days 285 calendar days
Joint Undertaking	n.a. [new approach under H2020]	TTS 92 calendar days	Not applicable any more in H2020, the only KPI is the 8 months
Joint Undertaking	FP7 latest known results?	-pre-financing (30 days) - interim payment (90 days) -final payment ((90days)	For ECSEL JU (H2020) payments: PF: 93% were on time Interim payments: 100% were on time Final payments: 100% were on time Experts: see elsewhere
Joint Undertaking	n.a. [new approach under H2020]		6,25% [2 out of 31: 1 SNE (non-successful recruitment) and 1 CA (retirement)]
Joint Undertaking			99.79% of CA 80.46% of PA
Joint Undertaking			67 payments were delayed (6.88% of the total administrative payments)

9.1.3 Indicators for monitoring cross-cutting issues

Correspondence in the general Annex 2	Cross-cutting issue	Definition/Responding to question	Type of data required
2	Widening the participation	2.1 Total number of participations by EU-28 Member State	Nationality of H2020 applicants & beneficiaries (number of)
		2.2 Total amount of EU financial contribution by EU-28 Member State (EUR millions)	Nationality of H2020 beneficiaries and corresponding EU financial contribution
NA		Total number of participations by Associated Countries	Nationality of H2020 applicants & beneficiaries (number of)
NA		Total amount of EU financial contribution by Associated Country (EUR millions)	Nationality of H2020 beneficiaries and corresponding EU financial contribution
3	SMEs participation	3.1 Share of EU financial contribution going to SMEs (Enabling & industrial tech and Part III of Horizon 2020)	Number of H2020 beneficiaries flagged as SME; % of EU contribution going to beneficiaries flagged as SME
6	Gender	6.1 Percentage of women participants in H2020 projects	Gender of participants in H2020 projects
		6.2 Percentage of women project coordinators in H2020	Gender of MSC fellows, ERC principle investigators and scientific coordinators in other H2020 activities
		6.3 Percentage of women in EC advisory groups, expert groups, evaluation panels, individual experts, etc.	Gender of memberships in advisory groups, panels, etc.
7	International cooperation	7.1 Share of third-country participants in Horizon 2020	Nationality of H2020 beneficiaries
		7.2 Percentage of EU financial contribution attributed to third country participants	Nationality of H2020 beneficiaries and corresponding EU financial contribution
9	Bridging from discovery to market	9.1 Share of projects and EU financial contribution allocated to Innovation Actions (IAs)	Number of IA proposals and projects properly flagged in the WP; follow up at grant level.
		9.2 Within the innovation actions, share of EU financial contribution focussed on demonstration and first-of-a-kind activities	Topics properly flagged in the WP; follow-up at grant level
NA		Scale of impact of projects (High Technology Readiness Level)	Number of projects addressing TRL between. . .(4-6, 5-7)?
11	Private sector participation	11.1 Percentage of H2020 beneficiaries from the private for profit sector	Number of and % of the total H2020 beneficiaries classified by type of activity and legal status
		11.2 Share of EU financial contribution going to private for profit entities (Enabling & industrial tech and Part III of Horizon 2020)	H2020 beneficiaries classified by type of activity; corresponding EU contribution

DRAFT

Data to be provided by:	Data to provide in/to	Direct contribution to ERA	Result end 2019
H2020 applicants & beneficiaries at the submission and grant agreement signature stage	JU AAR RTD Monitoring Report	YES	Participants at submission in calls 2019 from: AT ,BE,BG, CY, CZ,DE,DK,EL,ES,FI,FR, HU,IE,IT,LT, LV,N-L,NO,PL, PT,RO,SE, SL, SK,UK Representing 1138 participants At selection: same MS and 527 beneficiaries
H2020 beneficiaries at grant agreement signature stage	JU AAR RTD Monitoring Report	YES	The amount at grant agreement signature stage from calls 2019: 159M€ out of a total of 171M€
H2020 applicants & beneficiaries at the submission and grant agreement signature stage	JU AAR RTD Monitoring Report	YES	At the grant agreement signature stage: CH, NO, IL, TR 51 beneficiaries
H2020 beneficiaries at grant agreement signature stage	JU AAR RTD Monitoring Report	YES	The amount at grant agreement signature stage 12M€
H2020 beneficiaries at grant agreement signature stage	JU AAR RTD Monitoring Report		The amount at grant agreement signature stage 173 beneficiaries 16.3%
H2020 Beneficiaries through project reporting	JU AAR	YES	20%
H2020 beneficiaries at the grant agreement signature stage	JU AAR	YES	The amount at the grant agreement signature stage 0 This represents 0% of the coordinators
Compiled by Responsible Directorate/ Service/Joint Undertaking based on existing administrative data made available by the CSC	JU AAR	YES	Unavailable, no data received from CIC
H2020 beneficiaries at the grant agreement signature stage	JU AAR RTD Monitoring Report	YES	beneficiaries at the grant agreement signature stage in from calls 2019 1
H2020 beneficiaries at the grant agreement signature stage	JU AAR RTD Monitoring Report	YES	beneficiaries at the grant agreement signature stage 0%
Project Office – at GA signature stage he/she will be required to flag on SYGMA. Responsible Directorate/ Service (WP coordinator)/Joint Undertaking–via tool CCM2	JU AAR RTD Monitoring Report		at GA signature stage 6 projects
Responsible Directorate/Service (WP coordinator)/ Joint Undertaking–via tool CCM2	JU AAR RTD Monitoring Report		Information not available from CCM2
Joint Undertaking	JU AAR RTD Monitoring Report		For the JU this is the difference between RIA and IA actions. For the grant agreements in the grant agreement signature stage: 6 projects address the TRL levels with a focus 3-4 and 8 projects address the TRL levels with a focus 5-8
H2020 beneficiaries at grant agreement signature stage	JU AAR RTD Monitoring Report		The % private beneficiaries of the total H2020 beneficiaries at grant agreement signature stage from calls 2019 62%
H2020 beneficiaries at grant agreement signature stage	JU AAR RTD Monitoring Report		The % for at grant agreement signature stage 60%

Correspondence in the general Annex 2	Cross-cutting issue	Definition/Responding to question	Type of data required
12	Funding for PPPs	12.1 EU financial contribution for PPP (Art 187)	EU contribution to PPP (Art 187)
		12.2 PPPs leverage: total amount of funds leveraged through Art. 187 initiatives, including additional activities, divided by the EU contribution	Total funding made by private actors involved in PPPs in-kind contribution already committed by private members in project selected for funding additional activities (i.e. research expenditures/investment of industry in the sector, compared to previous year)
13	Communication and dissemination	13.3 Dissemination and outreach activities other than peer-reviewed publications–[Conferences, workshops, press releases, publications, flyers, exhibitions, trainings, social media, web-sites, communication campaigns (e.g. radio, TV)]	A drop down list allows to choose the type of dissemination activity. Number of events, funding amount and number of persons reached thanks to the dissemination activities
14	Participation patterns of independent experts	14.2 Proposal evaluators by country	Nationality of proposal evaluators
		14.3 Proposal evaluators by organisations' type of activity	Type of activity of evaluators' organisations
NA	Participation of RTOs and Universities	Participation of RTO3s and Universities in PPPs (Art 187 initiatives)	Number of participations of RTOs to funded projects and % of the total Number of participations of Universities to funded projects and % of the total % of budget allocated to RTOs and to Universities
NA	Ethics	The objective is ensuring that research projects funded are compliant with provisions on ethics efficiently	% of proposals not granted because non-compliance with ethical rules/proposals invited to grant (target 0%); time to ethics clearance (target 45 days)4
	Audit	Error rate	% of common representative error; % residual error
NA		Implementation of ex-post audit results	Number of cases implemented; in total €million; ´of cases implemented/total cases

Data to be provided by	Data o be provided in/to	Direct contribution to ERA	Result End 2018
Responsible Directorate/Service/	JU AAR		The EU contribution to ECSEL JU for the year 2018 amounts to: 210M€
Joint Undertaking Services	JU AAR RTD Monitoring Report JU annual accounts (part of)		The ratio of the cost committed by the private members (all beneficiaries in the projects) in the projects selected in 2017 divided by the EU funding for those partners equals: 4.0
H2020 Beneficiaries through project reporting	JU AAR RTD Monitoring Report	YES	1730 peerreviewed open access publications Other information is not available
Responsible Directorate/Service/Joint Undertaking in charge with the management of proposal evaluation	JU AAR		This information is available in Chapter 5
Responsible Directorate/Service/Joint Undertaking in charge with the management of proposal evaluation	JU AAR	YES	This information is available in Chapter 5
H2020 beneficiaries at the grant agreement signature stage	JU AAR RTD Monitoring Report	YES	at the grant agreement signature stage from calls 2019 (no difference is made between RTOs and universities) 37%of all the beneficiaries 340% of EU funding
Responsible Directorate/Service/Joint Undertaking	JU AAR RTD Monitoring Report		0%
CAS	JU AAR RTD Monitoring Report		Figures from CAS not available
CAS	JU AAR RTD Monitoring Report		Figures from CAS not available

9.1.4 Scoreboard of KPIs specific to ECSEL JU

The KPIs were adapted in the Work Plan 2020 and guidelines were provided, they are presented in the following tables.

Operational performance

KPI	Definition	Baseline	Objective for year 2020	2019 result
OP-1	% New participating entities	33%	>40%	43%
OP-2	Success rate %	17%	>25%	39%
OP-3	Budget % of selected projects along value chain	not yet defined	not yet defined	
OP-4	Time to grant % below maximum time	100%	100%	92%
OP-5	Time to payments % Late	2%	<2%	1.92%
OP-6	% Projects achieving insufficiently (Monitoring)	5%	<5%	2%
OP-7	Lighthouse activity	5	>5	Industry.E: 12; Health.E: 6; Mobility.E: 7
OP-8	Ethics: projects not complying	2%	<2%	0%
OP-9	Redress requested	0	0	0
OP-10	Gender (%women in projects)	Under study	Under study	
OP-11	Participants from non-EU state	5%	7%	9%
OP-12	Error rate: % common representative errors	2%-5%	<2%	1.48%
OP-13	Events/Communication	10	>10	>14

Table 27: KPIs for operational performances

KPI	Definition	Description
OP-1	% New participating entities	Percentage of entities (identified by using PIC number) to total that are participating in one of the submitted proposals at the FPP stage and that have not participated in any of the proposals at FPP stage in the 3 preceding years.
OP-2	Success rate %	Percentage of selected and funded proposals to all eligible submitted proposals at FPP stage
OP-3	Budget % of selected projects along value chain	To allow a proper measure for this we need a reliable portfolio analysis. The portfolio analysis is in progress.
OP-4	Time to grant % below maximum time	Percentage of grants that are signed in time (that is within the 8 months from the FPP deadline)
OP-5	Time to payments % Late	Percentage of payments (operational and administrative) that are past deadline
OP-6	% Projects achieving insufficiently (Monitoring)	Percentage of the project under monitoring that are assessed as insufficient at yearly review
OP-7	Lighthouse activity	Number of events attended or organised
OP-8	Ethics: projects not complying	Percentage of projects that at review show insufficient on the ethics part.
OP-9	Redress requested	Redress requested in any of the workflows
OP-10	Gender (%women in projects)	Under study
OP-11	Participants from non-EU state (associated or third country)	Percentage of participants in selected projects from non-EU countries
OP-12	Error rate: % common representative errors	% common representative errors
OP-13	Events/Communication	Number of: presentations given by ECSEL staff at non ECSEL events, publications, organised events by ECSEL.

Table 28: Guidelines for the KPIs for operational performances

Programme performance KPI

KPI	Definition	Baseline	Objective for year 2020	2019 result
PP-1	Number of projects	10	>12	14
PP-2	National Funding / EU Funding per year	0.92	0.95	0.96
PP-3	Private partners / Public partners	1.5	2.0	1.67
PP-4	Average Size of project RIA	27M€ H2020 Cost 30 Beneficiaries	27M€ H2020 Cost 30 Beneficiaries	25.5M€ 33
PP-5	Average Size of project IA	80M€ H2020 Cost 40 Beneficiaries	80M€ H2020 Cost 40 Beneficiaries	75M€ 52
PP-6	EU-countries without national funding Countries participating in the call	5 20	<5 >20	7 (BG, CY, DK, EL, LT, SL, UK) 29
PP-7	Oversubscription	2.0	2.0	1.9
PP-8	Number of patents per 10MEuro of EU funding	3	>3	1.13
PP-9	Participation of SME to the programme	25%	>25%	16.3%
PP-10	Publications	Under study	Under study	1293

Table 29: KPIs for programme performances

KPI	Definition	Description
PP-1	Number of projects	Number of selected projects
PP-2	National Funding / EU Funding per year	Ratio for the selected projects of the total national funding to the total EU funding
PP-3	Private partners / Public partners	Ratio for the selected projects of the total participation of private entities (Large enterprises and SMEs) to the public entities
PP-4	Average Size of project RIA	Average H2020 cost for selected project and Average number of beneficiaries for selected project
PP-5	Average Size of project IA	Average H2020 cost for selected project and Average number of beneficiaries for selected project
PP-6	EU-countries without national funding Countries participating in the call	Number of EU countries without national funding in the call but with beneficiaries in the selected calls All countries participating in the selected projects of the call
PP-7	Oversubscription	Average of EU and national oversubscription. Oversubscription is calculated as the requested funding for the eligible proposals submitted at the FPP divided by the total amount that is committed by the funding authority
PP-8	Number of patents per 10MEuro of EU funding	Number of patents for all finished ECSEL projects divided by the total EU funding for those projects (per 10M€)
PP-9	Participation of SME to the programme	Proportion of SMEs participating in the selected projects of the calls of that year.
PP-10	Publications	Number of publications in one year as published by the projects under review

Table 30: Guidelines for the KPIs for programme performances

Impact KPI

Will be defined according to the lines of the KIP defined for the Horizon Europe programme.

9.2 Annex II. Financial Management

In accordance with Council Regulation (EC) No 561/2014 of 06 May 2014 establishing the ECSEL Joint Undertaking under Article 187 of the Treaty on the Functioning of the European Union, the ECSEL JU is financed through contributions from its members, including cash contributions from the EU and Industry Associations (AENEAS, ARTEMIS-IA and EPoSS) for its running costs and a cash contribution from the EU for its operational activities.

9.2.1 Legal framework

The budget is the instrument which, for each financial year, forecasts and implements the revenue and expenditure considered necessary for the Joint Undertaking.

The budget is established and implemented in compliance with the principles of unity and budgetary accuracy, annuality, equilibrium, unit of account, universality, specification, sound financial management and transparency:

- Unity and budget accuracy: all ECSEL JU expenditures and revenues must be incorporated in a single budget document and must be booked on a budget line and expenditures must not exceed authorised appropriations
- Annuality: appropriations entered are authorised for a single year and must therefore be used during that year
- Equilibrium: revenues and expenditures shown in the budget must be in balance (estimated revenue must equal payment appropriations)
- Unit of account: the budget is drawn up and implemented in euro (EUR) and accounts are presented in euro
- Universality: this principle comprises two rules:
  - The rule of non-assignment, meaning that budget revenue must not be earmarked for specific items of expenditure (total revenue must cover total expenditure)
  - The gross budget rule, meaning that revenues and expenditures are entered in full in the budget without adjustments against each other
- Specification: each appropriation is assigned to a specific purpose and a specific objective
- Sound financial management: budget appropriations are used in accordance with the principle of sound financial management, namely in accordance with the principles of economy, efficiency and effectiveness
- Transparency: the budget is established and implemented, and accounts presented in compliance with the principle of transparency–budget and amending budgets are published on the website of the ECSEL Joint Undertaking.

9.2.2 Budget Structure and fund sources

The budget of the ECSEL JU is divided into three titles as follows:

TITLE 1 Staff expenses: salaries and allowances, external staff costs (trainees and interims), recruitment, missions expenses and socio-medical infrastructure and staff training.

TITLE 2 Administrative expenses: running costs for the functioning of the office, experts' costs related to project evaluations and reviews, communication and audit and legal activities.

TITLE 3 Operational expenses: costs related exclusively to FP7 and H2020 selected projects.

Fund sources include funds from the current year (C1), funds carried over from the previous year (C2), funds carried forward (C8), as well as internal assigned revenues (C4).

9.2.3 Budget revenue

According to the financial rules of ECSEL JU, revenues are funds made available to the Joint Undertaking by different sources to cover administrative and operational expenditures for a year and form part of the annual budget.

In accordance with the provisions of the legal framework applicable to the ECSEL JU, there are two main contributors to the budget of the JU:

- The EU budget on a decision of the European Parliament and the Council upon proposal of the Commission. This contribution is intended to fund projects (operational costs) and part of the running costs.
- The Industry represented by the Private Members (for the time being AENEAS, ARTEMIS-IA and EPoSS) contributing to part of the running costs in accordance with the JU statutes.

Until now, none of the ECSEL Participating States has opted in favour of entrusting the ECSEL JU with the management of their financial contribution, as foreseen in the provisions of Article 17.1 of the Statutes of the ECSEL JU.

TABLE 7 : SITUATION ON REVENUE AND INCOME IN 2019 for ECSEL (in €)							
Chapter	Revenue and income recognized			Revenue and income cashed from			Outstanding balance
	CurrentyearRO	CarriedoverRO	Total	CurrentYearRO	CarriedoverRO	Total	
	1	2	3=1+2	4	5	6=4+5	7=3-6
20 Revenuesandcontributions	172,855,143.88	217,737.56	173,072,881.44	172,731,236.53	185,946.29	172,917,182.82	155,698.62
Total ECSEL	172,855,143.88	217,737.56	173,072,881.44	172,731,236.53	185,946.29	172,917,182.82	155,698.62

Source: ABAC DWH

9.2.4 Budget Expenditure

TABLE 1: OUTTURN ON COMMITMENT APPROPRIATIONS IN 2019 (in Mio €) for ECSEL					
			Commitment appropriations authorised	Commitments made	%
			1	2	3=2/1
Title 1 Staff expenditure					
1	11	Staff expenditure	3.26	3.26	100.00%
	12	Recruitment and transfer	0.00	0.00	100.00%
	13	Mission expenses	0.09	0.09	97.37%
	14	Socio-medical infrastructure & training	0.08	0.08	100.00%
Total Title 1			3.43	3.43	99.93%
Title 2 Building, equipment and miscellaneous operating expenditure					
2	20	Rental of buildings and associated costs	0.51	0.51	100.00%
	21	Information and communication technology	0.33	0.33	100.00%
	22	Movable property and associated costs	0.00	0.00	100.00%
	23	Current administrative expenditure	0.07	0.07	100.00%
	24	Postage / Telecommunications	0.02	0.02	100.00%
	25	Formal and other meetings and representation	0.04	0.04	100.00%
	26	R&D support (evaluations and reviews)	0.52	0.52	100.00%
	28	Communication	0.35	0.35	100.00%
	29	Audits	0.06	0.06	100.00%
Total Title 2			1.90	1.90	100.00%
Title 3 Operational expenditure					
3	31	Selected projects after annual calls FP7	0.36	0.00	0.00%
	32	Selected projects after annual calls H2020	198.27	198.21	99.97%
Total Title 3			198.64	198.21	99.78%
Total ECSEL			203.97	203.53	99.79%

Source: ABAC DWH

* Commitment appropriations authorised include, in addition to the budget voted by the Governing Board, appropriations carried over from the previous exercise, budget amendments as well as miscellaneous commitment appropriations for the period (e.g. internal and external assigned revenue).

On top of the approved budget of EUR 203.53 M for commitment appropriations, assigned revenue of EUR 0.433 M is also included, leading to a total of EUR 203.97 M.

TABLE 2: OUTTURN ON COMMITMENT APPROPRIATIONS IN 2019 (in Mio €) for ECSEL					
			Commitment appropriations authorised	Commitments made	%
			1	2	3=2/1
Title 1 Staff expenditure					
1	11	Staff expenditure	3.28	3.26	99.36%
	12	Recruitment and transfer	0.01	0.01	70.95%
	13	Mission expenses	0.10	0.10	91.61%
	14	Socio-medical infrastructure & training	0.11	0.07	69.92%
Total Title 1			3.50	3.44	98.17%
Title 2 Building, equipment and miscellaneous operating expenditure					
2	20	Rental of buildings and associated costs	0.51	0.50	97.85%
	21	Information and communication technology	0.41	0.25	62.27%
	22	Movable property and associated costs	0.00	0.00	44.45%
	23	Current administrative expenditure	0.07	0.06	89.55%
	24	Postage / Telecommunications	0.02	0.01	68.06%
	25	Formal and other meetings and representation	0.06	0.05	85.54%
	26	R&D support (evaluations and reviews)	0.57	0.51	88.82%
	28	Communication	0.36	0.26	70.24%
	29	Audits	0.09	0.04	44.86%
Total Title 2			2.09	1.68	80.46%
Title 3 Operational expenditure					
3	31	Selected projects after annual calls FP7	44.80	20.31	45.32%
	32	Selected projects after annual calls H2020	182.15	161.68	88.77%
Total Title 3			226.95	181.99	80.19%
Total ECSEL			232.54	187.11	80.46%

Source: ABAC DWH

** Payment appropriations authorised include, in addition to the budget voted by the Governing Board, appropriations carried over from the previous exercise, budget amendments as well as miscellaneous payment appropriations for the period (e.g. internal and external assigned revenue).*

On top of the approved budget of EUR 232.11 M for payment appropriations, assigned revenue of EUR 0.433 M is also included, leading to a total of EUR 232.54 M.

Under Budget line B03200, on top of the payments related to projects, the payment for the Impact study referred to in section 5.6 Call for tenders is also included.

TABLE 3 : BREAKDOWN OF COMMITMENTS TO BE SETTLED AT 31/12/2019 (in Mio €) for ECSEL									
Chapter			Commitments to be settled				Commitments to be settled from financial years previous to 2018	Total of commitments to be settled at end of financial year 2019	Total of commitments to be settled at end of financial year 2018
			Commitments	Payments	RAL	% to be settled			
			1	2	3=1-2	4=1-2/1	5	6=3+5	7
1	11	Staff expenditure	3.26	3.24	0.02	0.47%	0.01	0.02	0.06
	12	Recruitment and transfer	0.00	0.00	0.00	7.74%	0.00	0.00	0.01
	13	Mission expenses	0.09	0.08	0.01	6.52%	0.01	0.02	0.03
	14	Socio-medical infrastructure & training	0.08	0.06	0.02	22.05%	0.01	0.03	0.03
Total Title 1			3.43	3.39	0.04	1.15%	0.04	0.07	0.12

TABLE 3 : BREAKDOWN OF COMMITMENTS TO BE SETTLED AT 31/12/2019 (in Mio €) for ECSEL									
Chapter			Commitments to be settled				Commitments to be settled from financial years previous to 2018	Total of commitments to be settled at end of financial year 2019	Total of commitments to be settled at end of financial year 2018
			Commitments	Payments	RAL	% to be settled			
			1	2	3=1-2	4=1-2/1	5	6=3+5	7
2	20	Rental of buildings and associated costs	0.51	0.49	0.01	2.74%	0.03	0.04	0.04
	21	Information and communication technology	0.33	0.20	0.13	38.50%	0.06	0.19	0.18
	22	Movable property and associated costs	0.00	0.00	0.00	90.24%	0.02	0.02	0.02
	23	Current administrative expenditure	0.07	0.06	0.01	10.45%	0.01	0.02	0.01
	24	Postage / Telecommunications	0.02	0.01	0.01	37.79%	0.01	0.02	0.02
	25	Formal and other meetings and representation	0.04	0.03	0.00	8.55%	0.05	0.05	0.06
	26	R&D support (evaluations and reviews)	0.52	0.46	0.06	11.45%	0.09	0.15	0.15
	28	Communication	0.35	0.25	0.11	30.63%	0.10	0.21	0.13
	29	Audits	0.06	0.02	0.05	75.31%	0.08	0.13	0.10
Total Title 2			1.90	1.52	0.37	19.73%	0.45	0.83	0.70

TABLE 3 : BREAKDOWN OF COMMITMENTS TO BE SETTLED AT 31/12/2019 (in Mio €) for ECSEL									
Chapter			Commitments to be settled				Commitments to be settled from financial years previous to 2018	Total of commitments to be settled at end of financial year 2019	Total of commitments to be settled at end of financial year 2018
			Commitments	Payments	RAL	% to be settled			
			1	2	3=1-2	4=1-2/1	5	6=3+5	7
3	31	Selected projects after annual calls FP7	0.00	0.00	0.00	0.00	60.89	60.89	81.19
	32	Selected projects after annual calls H2020	198.21	34.45	163.76	0.83	175.02	338.78	307.99
Total Title 3			198.21	34.45	163.76	0.83	235.91	399.67	389.18
Total :			203.53	39.36	164.17	0.81	236.40	400.57	390.00

Source: ABAC DWH

9.2.5 Amounts due to be recovered

TABLE 8 : RECOVERY OF PAYMENTS in for ECSEL (in €)
(Number of Recovery Contexts and corresponding Transaction Amount)

Year of Origin (commitment)	Total undue payments recovered		"Total transactions in recovery context (incl. non-qualified)"		% Qualified/Total RC	
	Nbr	ROAmount	Nbr	ROAmount	Nbr	ROAmount
Sub-Total						

EXPENSES BUDGET	Irregularity		OLAF Notified		Total undue payments recovered		"Total transactions in recovery context (incl. non-qualified)"		% Qualified/Total RC	
	Nbr	Amount	Nbr	Amount	Nbr	Amount	Nbr	Amount	Nbr	Amount
INCOMELINES IN INVOICES	5	16,634.30			5	16,634.30	5	16,634.30	100.00%	100.00%
NONELIGIBLE IN COST CLAIMS	4	9,639.96			4	9,639.96	4	9,639.96	100.00%	100.00%
CREDITNOTES										
Sub-Total	9	26,274.26			9	26,274.26	9	26,274.26	100.00%	100.00%
GRANDTOTAL	9	26,274.26			9	26,274.26	9	26,274.26	100.00%	100.00%

Source: ABAC DWH

9.2.6 Commitments to the ECSEL JU Programme ("Article 4")

The Council Regulation establishes in article 4.4 the obligation of the Participating States and the Private Members to report their contributions in order to monitor that they meet the objectives fixed (Euro 1,170 Million for the Participating States and Euro 1,657.5 Million for the Private Members or their constituent entities and affiliated entities, for the whole duration of the programme).

At this stage, only estimations can be provided by the constituent entities and affiliated entities of the Private members (i.e. the Industry Associations AENEAS, ARTEMIS-IA and EPOSS) because no recognition of costs or payments (except pre-financing) has been done by ECSEL JU or by the Participating States.

The formula stated in article 16.3.c of the Council Regulation establishing ECSEL JU defines the in-kind contribution as Total Cost incurred by the private members or their constituent entities and affiliated entities less the financial contribution of ECSEL JU and less the financial contribution of the Participating States. In this context, the concept of financial contribution to the projects can only be established at the end of the project when the private members can establish their in-kind contributions (i.e. many Participating States recognise costs only at the end of the project).

Following the instructions of the Accounting Officer of the European Commission, once certified, the in-kind contribution should be recorded in the Net Assets. In the meantime, it is recorded in the liabilities as an estimate.

On 28 June 2016, the Governing Board adopted the "pro-rata temporis" methodology for reporting the in-kind contributions in operational activities (Decision ECSEL GB-2016.66).

In January 2020 the private members following the "pro-rata temporis" methodology declared 273 M € as estimated in-kind contribution for the year 2019, and the accumulated amount reached 968 M €.

Estimated IKOP for 2019 (in €)	
Calls 2014	44,996.78
Calls 2015	30,180,133.90
Calls 2016	91,651,697.36
Calls 2017	90,664,781.20
Calls 2018	61,024,280.24
Total (estimated) IKOP for 2019	**273,565,889.47**
Cumulative (estimated) IKOP 2014-2019	**967,697,121.03**

It is important to clarify that the Regulation refers only to constituent entities and affiliated entities of the Private Members (i.e. the members of the Industry Associations) and excludes for this obligation the beneficiaries that are not members of any of the Industry Associations.

However, based on the funding decisions of the Public Authorities Board for Calls 2014, 2015, 2016, 2017 and 2018 and the Private Members declarations, it is possible to calculate the commitments for the five first calls as shown in the table below:

Calls	2014	2015	2016	2017	2018	Total
"Private members (IKOP)"	234.45	264.26	341.90	283.66	325.04	**1,449.31**
Other private beneficiaries	116.65	57.89	81.14	56.33	73.75	**385.76**
Total private beneficiaries	351.10	322.15	423.04	339.99	398.79	**1,835.07**
Participating states	143.70	126.27	133.70	161.82	198.04	**763.53**
EU funding	155.00	142.22	163.67	171.95	200.98	**833.82**
Total costs	**649.80**	**590.64**	**720.41**	**673.76**	**797.81**	**3,432.42**

(*) No members of the Industry Associations

For year 2019, 18 Participating States declared contributions (in cash) that amount to 101.74 M€ that added to previous years reach the total amount of 341.59 M€.

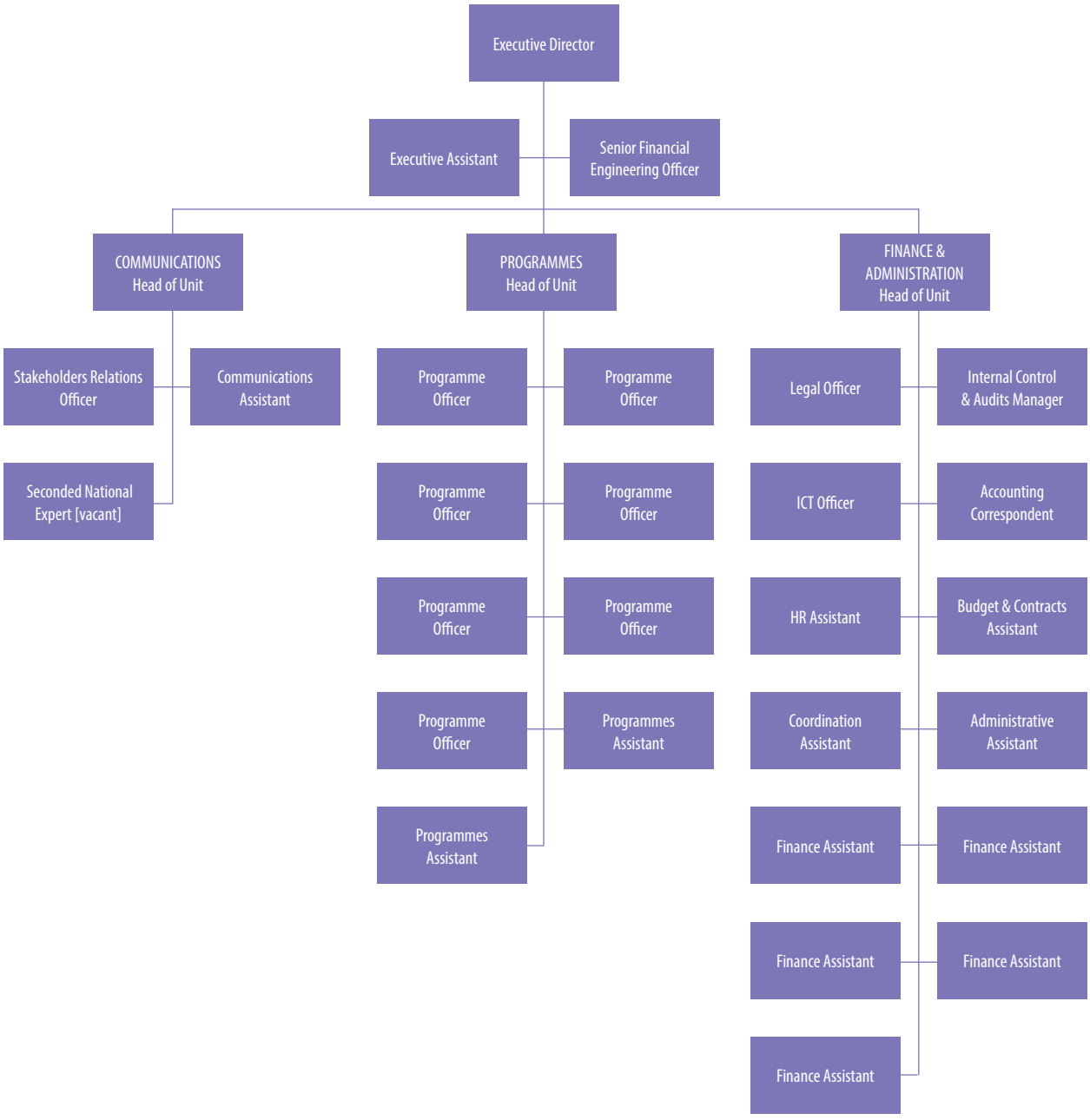
Note: The above figures are those related to the provisional accounts and are not yet audited by the Court of Auditors.

9.3 Annex III. Establishment plan at 31.12.2019

Positions	ED	Unit A	Unit B	Unit C	Total
TAD	2	2	8	2	14
TAST					
CA	1	1	2	12	16
SNE		[1]			[1]
Total	3	3	10	14	30

ED Executive Director's Office
TAD Temporary Agent - Administrator
TAST Temporary Agent - Assistant
CA Contract Agent
SNE Second National Expert
(position authorised but not yet filled)

9.4 Annex IV. Organisational chart



9.5 Annex V. Accrual based accounting system

According to ECSEL financial rules, the accounting of the JU shall conform to the accounting rules referred to the Financial Regulation applicable to the general budget of the Union.

ECSEL JU's accounting function has been assigned to DG BUDG of the European Commission since July 2018, hence the Accountant of the European Commission serves also as the Accountant of ECSEL.

9.5.1 Validation of financial and accounting systems by the Accounting Officer of the ECSEL JU

For its financial management information purposes, the ECSEL JU uses ABAC Workflow for budgetary accounting and SAP for General Ledger accounting. Both systems are managed by the European Commission.

Since July 2018, DG BUDG is the accountant of the ECSEL JU as per GB decision.

9.5.2 Provisional Annual Accounts for the year 2019 at closing date 31/12/2019

9.5.2.1 Balance Sheet at 31.12.2019 in /000EUR

BALANCE SHEET

EUR '000

	31.12.2019	31.12.2018
NON-CURRENT ASSETS		
Intangible assets	0	1
Property, plant and equipment	60	67
Pre-financing	96 105	3 231
	96 165	**3 299**
CURRENT ASSETS		
Pre-financing	95 552	57 204
Exchange receivables and non-exchange recoverables	154 673	171 896
	250 225	**229 099**
TOTAL ASSETS	**346 390**	**232 399**
CURRENT LIABILITIES		
Payables and other liabilities	(979 602)	(696 893)
Accrued charges and deferred income	(117 999)	(25 755)
	(1 097 601)	**(722 648)**
	(1 097 601)	**(722 648)**
NET ASSETS	**(751 211)**	**(490 249)**
Contribution from Members	1 365 553	1 191 524
Accumulated deficit	(1 681 773)	(1 261 951)
Economic result of the year	(434 990)	(419 822)
NET ASSETS	**(751 211)**	**(490 249)**

9.5.2.2 Statement of Financial Performance in /000EUR

STATEMENT OF FINANCIAL PERFORMANCE

EUR '000

	2019	2018
REVENUE		
Revenue from non-exchange transactions		
Recovery of expenses	167	51
	167	**51**
Revenue from exchange transactions		
Financial revenue	6	(3)
Other	0	70
	6	**67**
Total revenue	**172**	**118**
EXPENSES		
Operational costs	(429 496)	(415 087)
Staff costs	(3 297)	(2 971)
Finance costs	(6)	(0)
Other expenses	(2 364)	(1 881)
Total expenses	**(435 163)**	**(419 940)**
ECONOMIC RESULT OF THE YEAR	**(434 990)**	**(419 822)**

9.6 Materiality criteria

The 'materiality' concept provides the Executive Director with a basis for assessing the importance of the weaknesses/risks identified and thus whether those weaknesses should be subject to a formal reservation to his declaration. The materiality criteria is applicable to the H2020 programme.

When deciding whether something is material, both qualitative and quantitative terms have to be considered.

In qualitative terms, when assessing the significance of any weakness, the following factors are taken into account:

- The nature and scope of the weakness;
- The duration of the weakness;
- The existence of compensatory measures (mitigating controls which reduce the impact of the weakness);
- The existence of effective corrective actions to correct the weaknesses (action plans and financial corrections) which have had a measurable impact.

In quantitative terms, in order to make a judgement on the significance of a weakness, the potential maximum (financial) impact is quantified.

Whereas the ECSEL JU control strategy is of a multi-annual nature (i.e. the effectiveness of the JU's control strategy can only be assessed at the end of the programme, when the strategy has been fully implemented and errors detected have been corrected), the Executive Director is required to sign a declaration of assurance for each financial year. In order to determine whether to qualify his declaration of assurance with a reservation, the effectiveness of the JU's control system has to be assessed, not only for the year of reference, but more importantly, with a multi-annual outlook.

The control objective for ECSEL JU is to ensure that the 'residual error rate', i.e. the level of errors which remain undetected and uncorrected, does not exceed 2 % by the end of the JU's programme. Progress towards this objective is to be (re)assessed annually, in view of the results of the implementation of the ex-post audit strategy. As long as the residual error rate is not (yet) below 2 % at the end of a reporting year within the programme's life cycle, a reservation would (still) be made. Nevertheless, apart from the residual error rate, the Executive Director may also take into account other management information at his disposal to identify the overall impact of a weakness and determine whether or not it leads to a reservation.

If an adequate calculation of the residual error rate is not possible, for reasons not involving control deficiencies, the consequences are to be assessed quantitatively by estimating the likely exposure for the reporting year. The relative impact on the declaration of assurance would then be considered by analysing the available information on qualitative grounds and considering evidence from other sources and areas (e.g. information available on error rates in more experienced organisations with similar risk profiles).

EFFECTIVENESS OF CONTROLS

The starting point for determining the effectiveness of the controls in place is the 'representative error rate' (RepER) expressed as a percentage of errors in favour of the ECSEL JU detected by ex-post audits measured with respect to the amounts accepted after ex-ante controls.

The representative error rate will be based on the weighted average error rate (WAER) for a population, from which a random sample has been drawn according to the following formula:

$$\mathbf{WAER\% = \frac{\Sigma\,(er)}{A} = RepER\%}$$

Where:

Σ (er) = sum of all individual error rates of the sample (in value). Only the errors in favour of the JU will be taken into consideration;

A = total amount of the audited sample expressed in €.

Second step: calculation of residual error rate.

In order to take into account the impact of the ex-post controls, this error level is to be adjusted by subtracting:

- errors detected and corrected as a result of the implementation of audit conclusions;
- errors corrected as a result of the extrapolation of audit results to non-audited contracts with the same beneficiary.

This results in a residual error rate, which is calculated by using the following formula:

$$\mathbf{ResER\% = \frac{[RepER\% * (P\text{-}A) - RepERsys\% * E]}{P}}$$

Where:

ResER% = residual error rate, expressed as a percentage;

RepER% = representative error rate, or error rate detected in the representative sample, in the form of the WAER, expressed as a percentage and calculated as described above (WAER%);

RepERsys% = systematic portion of the RepER% (the RepER% is composed of complementary portions reflecting the proportion of 'systematic' and 'non-systematic' errors detected) expressed as a percentage.

P = total amount of the auditable population of cost claims, expressed in EUR;

A = total amount of all audited amounts, expressed in EUR.

E = total non-audited amounts of all audited beneficiaries, expressed in EUR. This will comprise the total amount of all non-audited but validated and paid costs for all audited beneficiaries, excluding those beneficiaries for which an extrapolation is ongoing.

This calculation will be performed on a point-in-time basis, i.e. all the figures will be provided as of a certain date.

9.7 List of acronyms

DRAM	Dynamic Random-Access Memory	**LEIT**	Leadership in Enabling and Industrial Technologies
EC	European Commission	**KET**	Key Enabling Technology
ECA	European Court of Auditors	**KPI**	Key Performance Indicator
ECSEL	"Electronic Components and Systems for European Leadership"	**LISO**	Local IT Security Officer
EDPS	European Data Protection Supervisor	**MASP**	Multi Annual Strategic Plan
EPS	ECSEL Participating State	**MASRIA**	Multi Annual Strategic Research and Innovation Agenda
ESIF	European Structural and Investment Funds	**MEMS**	Micro Electro Mechanical System
EUR	Euro	**NFA**	National Funding Authority
FPP	Full Project Proposal	**NGA**	National Grant Agreement
GB	Governing Board	**NPA**	National Public Authority
IA	Innovation Action	**PAB**	Public Authorities Board
IAS	Commission's Internal Audit Services	**PO**	Preliminary Offer Programme Officer Project Outline Programme Office
ICS	Internal Control Standard	**R&D&I**	Research, Development and Innovation
IDM	Integrated Devices Manufacturer	**R&D**	Research and Development
IT	Information Technology	**RIA**	Research and Innovation Action
IPCEI	Important Project of Common European Interest	**RIAP**	Research and Innovation Activities Plan
JTI	Joint Technology Initiative	**TRL**	Technology Readiness Level
JU	Joint Undertaking	**WP**	Work Plan

Visiting address

ECSEL Joint Undertaking
Avenue de la Toison d'Or 56-60
1060 Brussels
Belgium

Post address

ECSEL Joint Undertaking
TO 56 5/5,
B-1049 Brussels
Tel +32 2 221 81 02
Fax +32 2 221 81 12
info@ecsel.eu
www.ecsel.eu