Open Call 1

Annex 1: Guide for Applicants

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TABLE OF CONTENTS

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LIST OF FIGURES

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LIST OF TABLES

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ABBREVIATIONS & ACRONYMS

AI	Artificial Intelligence
BAU	Business As Usual
COP	Community Of Practice
D	Deliverable
DOE	Design Of Experiments
DT	Digital Twin
D&C	Dissemination And Communication
GA	Grant Agreement
HW	Hardware
KPI	Key Performance Indicator
L	Lead
LCA	Life Cycle Assessment
LCC	Life Cycle Costing
M	Month
ML	Machine Learning
MS	Milestone
O	Objective
OC	Open Call
P	Participant
RP	Reporting Period
SME	Small And Medium Entreprise
SO	Specific Outcome
SW	Software
T	Task
TRL	Technology Readiness Level
UC	Use Case
WP	Work Package
w.r.t	With Respect To

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1 INTRODUCTION

AID4SME is a European Project under the Horizon Europe Programme (HORIZON-CL4-2024-DIGITAL-EMERGING-01) – Grant Agreement no. 101189562. The 36-month project kicked-off in December 2024 and counts with 16 partners from multiple sectors and European countries.

AID4SME aims to facilitate SMEs in developing combined AI and data solutions for large scale resource optimisation challenges for industries that have significant impact on the objectives of the Green Deal. Minimum 20 SMEs, selected through 2 open calls, will receive FSTP to develop these solutions with the support of a Community of Practice (COP). The ambition is to create a COP that will continue after the project lifetime. AID4SME brings together 9 technology blocks and low-TRL playgrounds from 4 scientific partners, to educate and support the SMEs. Additionally, 4 large industry partners (from automotive, whitegoods, battery and energy sector) provide real- life large scale resource optimization challenges that require combined AI and data solutions, and high-TRL playgrounds to integrate and demonstrate the solutions. AID4SME offers an open platform that is flexible to bring in challenges from outside the consortium. AID4SME provides the infrastructure and learning environment that enable the SMEs to solve the challenges, demonstrate solutions and grow into impactful enterprises. The technology blocks cover a wide area of AI & data technologies for the full cycle of data collection, creation of insights, decision support and automation. These technologies have the potential to have significant impact on the Green Transition and boost EU competitiveness for industries. AID4SME will collaborate with the AI-on-Demand platform to enrich its repository with the AID4SME tools and framework, while it is open to deploy the tools/frameworks already available on the AI-on- Demand platform for new use cases. AID4SME will assess the impact of the developed technologies on Green Deal objectives and on social and human aspects. AID4SME brings along partners who are experienced in re-skilling and up-skilling of SMEs and applying standardization as enabler for exploitation. The wide geographical coverage, with partners and DIHs from across Europe, ensures maximum impact.

This document presents the Open Call 1 rules that covers the open call scope, eligibility rules, evaluation process, timeline, funding and expected outcomes.

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1.1 Open Call 1 Overview

The AID4SME project provides SMEs and Start-ups a Community of Practice led, one-stop hub for developing combined AI solutions data for large scale industrial resource challenges and bringing them to the market. In line with the call text, the project will organize competitive calls to select and contract SMEs and Start-ups and their solutions to address AI and data challenges. Those solutions will solve large resource optimization challenges of industries that have high impact on the Green Deal objectives. The goal is to achieve a widespread deployment of the solutions developed by the SMEs and Start-ups, to increase the industry competitiveness, and environmental and resources sustainability.

These projects should demonstrate the potential for significant impact in areas such as:

- Impact on Green Deal: Developing solutions that reduce energy consumption and enhance efficiency in industrial processes; creating solutions that minimize waste and promote sustainable manufacturing practices; as well as innovating ways to reduce carbon footprints and mitigate environmental damage.
- Impact on social benefits: Developing solutions that have a profound social impact by fostering inclusive growth and improving quality of life. It aims to create job opportunities, enhance workforce skills, and promote social equity. By addressing key societal challenges, the project contributes to building resilient communities and supports the overall well-being of the population.
- Impact on resource optimization: Developing solutions that maximize the efficient use of resources across various industries. This includes optimizing supply chains, reducing material waste, and improving resource allocation.

Overall, AID4SME will fund (grant) the development, integration and validation of technology providers solutions (third parties):

- Open Call 1 aiming to fund up to 13 proposals, 14-months duration. The maximum funding is up to 150,000€
- Open Call 2 aiming to fund >=10 projects; 14-months duration.
- Funding rate of 70% of the costs.

The open call will follow a specific framework that ensure a fair and transparent process that encompasses the proposal submission, evaluation, sub-grantee agreement signature and project deployment. The open call stages are detailed in Figure 1.

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FIGURE 1: OPEN CALL FRAMEWORK

This document specifically relates to the first call "Open Call 1" Stages and respective rules are outlined in the following sections.

2 Proposal Submission

All proposals submitted via the online application form before the deadline. The project will receive proposals from June 30th 2025 at 12:00 PM CEST until September 11th 2025 at 5:00 PM CET will undergo an eligibility check. Projects that do not meet the eligibility criteria (outlined below) will be deemed ineligible and excluded from consideration. Throughout the entire evaluation process, the eligibility of each proposal will be assessed based on the information provided in the application.

2.1 Eligibility Criteria

2.1.1 Who can apply?

The open call will be open to different types of organisations. However, only SMEs and Start-Ups will receive the financial support to third parties. SMEs/Start-Up's will be the lead partner if apply as a single entity or in a consortium.

The following organisations may apply, either on an individual basis (single entity) or in a consortium of 2 entities:

- Micro, small and medium-sized enterprises working on related technologies (SMEs)
- Start-Ups

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The following entities may apply as the second partner in a consortium:

- Industry) organisations providing the SMEs / Start-ups use-cases and high-TRL playgrounds for solution testing and validation[1]
- integrators/engineering services providers that support the SMEs/Start-Ups in integration of the solutions.
- Research institutions, research infrastructures[2] , non-profit organisations and charitable (scientific) foundations and public research centres.

The entities selected to enter the programme must be registered and have a valid VAT by the contracting phase.

2.1.2 SME and Start-Up Definition

AID4SME will fund SMEs and Start-Ups applying as lead applicant to the Open Call 1 with an individual application (single entity) or in consortia of two entities or one entity and one natural person.

- **SME Definition**

An SME will be considered eligible only if it complies with the European Commission's Recommendation 2003/361/EC (https://single-market-economy.ec.europa.eu/smes/sme-fundamentals/sme-definition_en).

- **Start-Up Definition**

In the context of Horizon Europe, the term startup does not have a specific, universally defined meaning that differs from its general understanding. Instead, Horizon Europe often refers to start-ups within broader categories such as SMEs (Small and Medium-sized Enterprises).

Start-ups typically fall under the SME category if they meet certain criteria, such as having fewer than 250 employees and either an annual turnover of less than €50 million or a balance sheet total of less than €43 million.

For the purpose of this Open Call, a start-up should be understood as an SME in the early stage of its life cycle, including, but not limited to those that are created with the goal to find innovative solutions and

[1] The high-TRL playgrounds in AID4SME serve as real-world testing and validation environments where SMEs can implement and demonstrate their AI and data-driven solutions at TRL 6 to 7. These playgrounds are built around large-scale industrial challenges provided by the consortium's industry partners from the whitegoods, automotive, energy, and battery recycling sectors. These high-TRL playgrounds include pilot and full-scale production lines and are essential for validating the practical impact of the developed AI solutions.

[2] Research infrastructures are facilities that provide resources and services for the research communities to conduct research and foster innovation in their fields.

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scalable business models, and which is autonomous within the meaning of Article 3 of the Annex to Commission Recommendation 2003/361/EC (9).

During the contracting phase, the entity documents will be double-checked to confirm these principles.

2.1.3 Eligible Countries

Only applicants legally established entities and legal residents (natural persons) in any of the following countries (hereafter collectively identified as the "Eligible Countries") are eligible. The eligible countries and the countries eligible under specific conditions are listed in the following links:

- Member States (MS) of the European Union (EU), including their outermost region
- Horizon Europe Associated countries as defined in Horizon Europe rules for participation

2.1.4 Language

English is the official language of Open Call 1. Submissions done in any other language will be disregarded and not evaluated. English is also the only official language during the whole execution of the AID4SME sub-project. This means any requested submission of reports will be made in English to be eligible.

2.1.5 Other Eligibility Rules

Single applicants, consortium members and organisations will be considered eligible for AID4SME Open Call if they comply with ALL the following rules:

- This call is competitive, and applicants should focus on one specific challenge. Therefore, only one proposal per applicant/per organisation per challenge may be submitted to this call. If more than one proposal is identified, it will be automatically discarded.
- An application that targets more than 1 challenge will be automatically discarded.
- The legal entity is not under liquidation or is not an enterprise under difficulty according to the Commission Regulation No 651/2014, art. 2.18.
- The participating organisations should not have been declared bankrupt or have initiated bankruptcy procedures.
- Have not been convicted for fraudulent behaviours, other financial irregularities, unethical or illegal business practices.
- Its project is based on the original works and going forward, any foreseen developments are free from third-party rights, or they are clearly stated.
- People and organisations related to the AID4SME project (members of the consortium) are not eligible to participate in the open call. Applicants must not be directly or indirectly involved in AID4SME.
- If selected, the company should be incorporated/registered and have a valid VAT by the time of the Sub-Grantee Agreement signature stage.

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- Only applicants legally established (entities and legal residents (natural persons)) in any of the the “Eligible Countries” are eligible.
- The proposal submitted is described in the Technical Proposal document (according to the template provided – available on the project website: https://aid4sme.eu/open-call-1/).
- Documents sent by email will not be evaluated and the proposal will be automatically discarded.

2.1.6 Conflict of Interest

Applicants shall not have any actual or/and potential conflict of interest with AID4SME project during the selection process and the whole programme. All cases of conflict of interest will be assessed case by case. If any conflict of interest is identified at any phase of the call, the application will be immediately discarded. In particular, applicants cannot be AID4SME consortium partners or affiliated entities nor their employees or co-operators under a contractual agreement. Example: Suppose a conflict of interest is identified and confirmed at any the open call stages indicated in Figure 1. In that case, the proposal will be considered non-eligible to enter the programme and be discarded.

2.1.7 Preparing your Proposal

- The applicants will describe the solution using the following template [available at https://aid4sme.eu/open-call-1/].
- The proposals should be aligned with the project objectives, open call scope and address one of the challenges described in the following section (2.1.7.1).
- Fill in the form on the F6S platform [link to the platform] and upload the Technical Proposal document.
- Proposals must be submitted before September 11th 2025 at 5:00 PM CEST. To avoid missing the deadline, you are encouraged to submit your proposal as soon as possible.

2.1.8 Challenges

The open call challenges essentially focus on efficiently addressing climate change by improving resource efficiency and fostering social cohesion, crucial to promote the European transition to a more sustainable and digital economy. As such, through the open call, European organizations will have the opportunity to provide innovative solution for these challenges.

13 challenges are grouped into 4 domains as described in Table 1:

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Domain	Challenge
1) Combined AI and Data solutions for DATA COLLECTION	1.1- Augmented sensing solutions 1.2 - 2D/3D image analysis for large Energy Infrastructure predictive maintenance
2) Combined AI and Data solutions for creation of INSIGHTS	2.1 - Product-production Digital Twins 2.2 - Digital Twin based lifespan analysis tool 2.3- Energy system Digital Twin decision support tool
3) Combined AI and Data solutions for DECISION SUPPORT	3.1 - Digital Twin enabled smart production process planning tool
4) Combined AI and Data solutions for AUTOMATION	4.1 - Automated energy management for parts production 4.2 - Automated energy management for battery production 4.3 - Semi-automated EV battery disassembly for recycling 4.4 - Co-bot refrigerator door assembly solutions

TABLE 1: CHALLENGES

The Challenges are detailed and described in Annex 1.

2.1.9 Complaint due to a technical error of the AID4SME Online Submission Service

If you experience any problem with the application submission system before the open call deadline due to a technical error on the side of the AID4SME Online Submission Service (F6S Platform), you may lodge a complaint by email through support@f6s.com cc'ing the AID4SME OC Management Team (aid4sme.opencall@f6s.com) and explain your situation.

For the complaint to be admissible, it must be filed within 3 working days following the day of the call closure. What else to do? You should secure any proof of the alleged failure (e.g., screenshots). Later in the procedure, you may be requested by the F6S IT Helpdesk to provide these items.

For your complaint to be upheld, the F6S Support team will audit trail. The application log files and access log files of AID4SME Online Submission Service must show that there was indeed a technical problem on the platform side that prevented you from submitting your proposal using the electronic submission system.

Applicants will be notified about the outcome of their complaint. If a complaint is upheld, the secured files (provided to the IT helpdesk) for which the investigation has demonstrated that technical problems at the project prevented submission will be used as a reference for accepting the proposal for evaluation. Only proposals submitted before the deadline will be accepted. After the call closure, no additions or changes to received proposals will be considered.

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3 What will happen after the proposal is submitted?

Any information regarding the applied proposal will be treated in a strictly confidential manner.

Immediately after the submission deadline is over, the evaluation process begins (as described in detail in Section 3 of this Guide). Experts will evaluate proposals and score them adequately according to the quality of the content presented.

3.1 Evaluation

3.1.1 Eligibility Check

An initial eligibility check will be performed to filter and discard non-eligible proposals.

The eligibility criteria will verify:

- Applicants registered (for organisations) or legal resident (for individuals) in an EU Member State or a Horizon Europe Associated country [Yes/No].
- Submission has been made only through the F6S platform and by the defined deadline [Yes/No].
- The applicant submitted only one proposal, which is fully completed, including all required sections and attachments [Yes/No].
- Application to one of the proposed challenges [Yes/No].
- The lead applicant is an SME or Startup established in one of the EU Member States or a Horizon Europe-associated country as defined in Horizon Europe rules for participation [Yes/No].
- The proposal is written entirely in English [Yes/No].
- The applicant attached the proposal template document duly filled to the application form [Yes/No]. [The link to the document is available on the project website: https://aid4sme.eu/open-call-1/]

Eligible proposals will be shortlisted for the next step in the evaluation process.

Applicants whose proposals are deemed non-eligible will be notified via email of the results of the eligibility check. The eligibility check is final and is not subject to appeal.

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3.1.2 Evaluation of Proposals

After the final shortlists for evaluation will be created, the proposals will be given to the external expert evaluators that will perform the evaluation of the proposal.

Every proposal will be evaluated by 2 different experts. The criteria for evaluation will be:

1. Novelty/innovation, adequateness and quality of the proposed use-case solution
2. Impact of the proposed solution on green alignment, social and environmental sustainability and competitiveness of the use-case and its owner
3. Project planning and value for money
4. Expertise and excellence of the proposed team

The evaluation results (of the external expert evaluators) will be checked and validated by the COPs composed by consortium technical partners who will achieve a consensus (Evaluation Panel) aiming to approve a final list with the projects that will enter the AID4SME Programme.

3.1.2.1 Scores

1. Novelty/innovation, adequateness and quality of the proposed use-case solution [score between 1-5; with threshold > 3; weight 30%]
2. Impact of the proposed solution on green alignment, social and environmental sustainability and competitiveness of the use-case and its owner [score between 1-5; with threshold > 3; weight 30%]
3. Project planning and value for money [score between 1-5; with threshold > 3; weight 20%]
4. Expertise and excellence of the proposed team [score between 1-5; with threshold > 3; weight 20%]
5. Final Score - The final score is calculated based on the average of the scores provided by the evaluators [score between 1-5].

Score	Result	Description

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1	Fail	The proposal fails to address the criterion under examination or cannot be judged due to missing or incomplete information
2	Poor	The criterion is addressed in an unsatisfactory manner. There are serious inherent weaknesses
3	Good	While the proposal broadly addresses the criterion, there are significant weakness that would need correction
4	Very Good	The proposal addresses the criterion well, although certain improvements are possible
5	Excellent	The proposal successfully addresses all relevant aspects of the criteria in question. Any shortcomings are minor.

TABLE 2: EVALUATION - SCORING DESCRIPTION

Proposals must meet ALL the eligibility criteria described in Section 2. Proposals that do not meet one or more of the criteria will be deemed non-eligible and discarded.

Each criterion will be scored between 0 and 5. Half-point scores are not given. The final score (including each criterion) is calculated based on the average of the scores provided by the evaluators. Therefore, final scores may be decimals.

The threshold for each criterion is three (3), therefore any criterion with a score less than three will disqualify the application.

Applications submitted for AID4SME Open Call shall be unique and tailored to one of the challenges. Evaluators will flag applications with duplicate content or plagiarism cases. These applications cannot be considered for AID4SME Open Call 1 and will be rejected in the evaluation process under criterion one (Novelty/innovation).

At the end of the evaluation process, all eligible applications will be ranked per issued challenge.

Rule 1: The applications will be ranked based on their final score

Rule 2: If there is a tie between applications, these will be ranked according to the following order:

I. Best score on Novelty/innovation (Criterion 1)
II. Best score on Impact (Criterion 2);
III. Best score on Expertise and excellence of the proposed team (Criterion 3);
IV. Best score on Project planning and value for money (Criterion 4)

Rule 3: In case following Rule 3 there are still proposals in a funding borderline position, the Evaluation Panel members will be asked to read the specific proposals and break the tie by re-evaluating them.

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3.1.3 Final Selection

Following the individual evaluations of external experts, a consensus meeting will be organised. During this meeting, a ranking of the proposals per challenge will be agreed and where necessary an additional review of projects for which there was a lack of consensus in terms of scoring by individual evaluators or for which additional clarifications are required will be undertaken.

The outcome of this ranking (evaluation results) will be checked and validated by the COPs. They then formally approve a list of projects within the limits of the available funding and number of projects.

Any remaining budget from Open Call 1 will be reallocated. This budget may be added to Open Call 2, may be used to select additional higher-ranked projects from Open Call 1 based on their evaluation score, or may be used to increase the budget of already selected companies in Open Call 1.

3.1.4 Results Announcement

At the end of the evaluation process all proposals will be ranked based on their scores:

- **Number of Selected Projects**

AID4SME will select up ~13 to enter the programme, addressing different challenges.

- **Notification of Results**

All applicants will be notified of the results of the evaluation by email and will receive an Evaluation Summary Report (ESR).

- **Reserve list**

AID4SME will keep a reasonable number of applications in a reserve list, in case an applicant decides to withdraw or is not able to fulfil the contract requirements.

3.1.5 Appeal Procedure

If at the end of the evaluation process, the applicant considers that a mistake has been made or that the evaluators have acted unfairly or have failed to comply with the rules of this Open Call 1, and that her/his interests have been prejudiced as a result, the following appeal procedures are available.

A complaint should be drawn up in English and submitted by email to aid4sme.opencall@f6s.com. Any complaint made should include:

- Contact details.
- The subject of the complaint.
- Information and evidence regarding the alleged breach.

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Anonymous complaints or those not providing the information mentioned will not be considered.

Complaints should also be made within 3 working days of the announcement of the evaluation results to the applicants (applicants receive the evaluation summary report).

As a general rule, the project team will investigate the complaints to arrive at a decision to issue a formal notice or close the case within no more than 30 days from the date of reception of the complaint, provided that all the required information has been submitted by the complainant. Whenever this time limit is exceeded, the AID4SME Open Call management team will inform the complainant by email of the reasons for the unforeseen delay and the subsequent step.

4 Sub-Grantee Agreement

All the legal issues are accurately covered by the planned contracts with the sub-granted beneficiaries. A written sub-grantee agreement will be signed with successful applicants. It will foresee, among other things, the special clauses derived from Horizon Europe in cascading granting, the payment schedule and conditions (milestones), general legal text issues of rights and obligations by the AID4SME consortium, and each sub-grantee, including IPR and audit procedures.

The sub-grantee agreement will also have a set of annexes like the technical description of the project (form submitted), a declaration of honour to be signed, a declaration of SME existence, guidelines of the call, and any other document required by AID4SME to assure the correct execution of the sub-grantee projects. A sample of this document is attached here [link to the document on the project website].

Each winning applicant will sign a sub-grantee agreement (contract) with the project consortium.

A legal entity or natural person that do not provide the requested data and documents in due time will not enter the AID4SME Programme.

Applications will be rejected if the document analysis reveals any eligibility issues or conflict of interest.

5 Scientific Misconduct and Research Integrity

Issues of scientific misconduct and research integrity are taken very seriously. In line with the Horizon Europe Rules for Participation, appropriate action such as termination of the Sub-Grantee Agreement, the implementation of liquidated damages and financial penalties, suspension of payments, recoveries will be taken against any applicants/beneficiaries found to have misrepresented, fabricated or plagiarised any part of their proposal.

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6 Deployment

The Programme duration is 14 months. It means that the selected participants will implement and demonstrate the solutions during this period. The sub-projects will start after the sub-grantee agreement signature (See Figure 1). The full timeline, including the open call stages deadlines and programme timeline, is detailed in Table 10.

The third parties will be supported and monitored by the AID4SME team of experts to generate the expected outcomes. The AID4SME project provides SMEs and Start-ups with a Community of Practice (CoP) led, one-stop hub for developing combined AI solutions data for large scale industrial resource challenges and bringing them to the market.

This CoP composed by consortium technical partners will support the SMEs and Start-ups in the form of:

- Technical support with expertise in the technologies, engineering integration, testing and validation, and by access to public reusable results
- Technical support with access to the independent testing and validation facilities, so-called low-TRL playgrounds, of the project's scientific partners with specialisations in AI & data technologies for data collection, creation of insights, decision support, and automation.
- Technical and business support from large industry partners that will provide real-life use-cases and will open up their experimental facilities and/or production facilities, so-called high-TRL playgrounds, for testing and validation of the solutions at TRL 6/7. The industry partners cover the automotive, white goods, battery, and energy sectors.
- An open platform that is flexible to bring in challenges from industries outside the consortium.
- Business support and mentoring to develop business plans and a roadmap to exploitation of the third-party projects outcomes.

The programme will be divided into 4 stages (Plan, Development, Testing & Validation, Solution Assessment & Business Development):

- **Plan:** Participants will submit a complete plan of activities for the next 14 months, including the milestones, implementation plan, and expected outcomes in each programme stage.
- **Development:** Participants will develop the solution and proceed with integrations according to each solution proposed.
- **Testing & Validation:** Participants will test, validate, and demonstrate the solution.
- **Solution Assessment & Business Plan:** Participants will assess the solution and develop a business plan and roadmap to exploitation.

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The third parties will have the following assets at completion of the third-party projects:

- The third parties have demonstrated TRL 6/7 combined AI & Data solutions for large industrial resource optimization challenges, enabling an increase in EU industry competitiveness, and environmental and resources sustainability.
- The third parties have a roadmap and business model to bring their solutions to the market
- The third parties will have direct access to relevant DIH networks and communities. And their solutions are used to enrich the AI-on-Demand platform.
- The third parties will have direct access to Industry networks and associations from several manufacturing sectors to create business opportunities for their solutions.
- The industry partners inside AID4SME, but also industries that are brought in under the “bring your own use-case” challenges, have direct access to TRL 6/7 solutions tailored to the challenges they face in making their processes more competitive, and environmental and resource sustainable.
- The academic partners have strengthened their position in the relevant knowledge, application and DIH networks as enabling knowledge providers for combined AI and Data technologies for data collection, creation of insights, decision support, and automation.
- The expected outcomes of each challenge are described in Section 2.1.7.1.

6.1 Reporting

Selected applicants participating in the Open Call will be responsible for the following duties:

- **Third-Party Projects Implementation**

The programme will start in December 2025 and conclude with the implementation phase by January 2027.

- **Submission of Reports**

During and after the end of each stage, the third parties will submit reports containing the work deployed and the milestones achieved. The report content and delivery dates will be announced at the beginning of the programme.

These reports will be reviewed and approved/rejected by the AID4SME partners. The payment will be made against the reports’ approval.

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6.2 Funding Distribution

Each project funded will receive up to a maximum of €150,000 under a lump sum scheme, based on the approval of different milestones or KPIs and along the funnel approach presented below. The third parties that will receive financial support will receive 70% funding of their eligible costs.

6.3 Types of activity that qualify for financial support

Beside the value-added services and support / guidance from consortium the third-party beneficiaries will have access to a grant as mentioned in the above table below:

Call	Total Budget	Grant per Project	No of Projects	Duration
1	€2M	Up to €150,000	~13	14-months

TABLE 3: FUNDING DISTRIBUTION

Funding rate of 70% of the cost.

The payments are done against the approval of the following process:

1. Reception of the relevant deliverables/report (s) (see outline below).
2. A favourable resolution by the reviewer responsible for assessing the subproject execution.
3. Reception of Request for Payment electronically.
4. The Subgrantee's Bank Account matches the Instructions for payment issued by the bank of the Subgrantee.
5. Finally, the payments to the Subgrantee will be made by the Treasurer.
6. Payments will be released no later than thirty (30) calendar days after the review and approval of the reports/deliverables associated to a particular stage.

The payment will be done in instalments according to the following schema:

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Stage	Stage Duration	Amount	When ?
Plan	1 Month	30%	M2
Development	7 Months	40%	20% at mid-stage; 20% end-stage
Testing & Validation	2 Months	10%	10% end-stage
Solution Assessment & Business Plan	4 Months	20%	20% end-stage

TABLE 4: FUNDING SCHEMA

The activities that qualify for the financial support to third parties are:

- Internal personnel costs resulting from the development and management activities of third-party projects.
- Purchase costs necessary to carry out activities, e.g. hardware purchases.
- Travel and subsistence to attend meetings and events.
- All the funds disbursed will be based on concrete results (reports and demonstrations) and not administrative justifications.

6.4 Origin of Funds

Any selected proposer will sign a dedicated Sub-Grantee Agreement with AI4SME project consortium. The funds attached to the Sub-Grantee Funding Agreement come directly from the European Project AI4SME funds. AI4SME project consortium is managing the funds according to the Grant Agreement No 101189562 signed with the European Commission.

As will be indicated in the Sub-Grantee Agreement, the relation between the sub-grants and the European Commission through the AID4SME project carries a set of obligations to the sub-grants with the European Commission. It is the task of the sub-grants to accomplish them and of the AID4SME consortium partners to inform about them.

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6.5 Intellectual Property Rights

The ownership of all IPR created by the Open Call beneficiary, via the AID4SME funding, will remain with the Open Call beneficiary. Results are owned by the Party that generates them.

Nevertheless, many specific IPR cases that will need a concrete solution from the bases previously fixed, may exist. In these conflict situations are identified, the project consortium will be responsible to analyse the case and arbitrating a solution.

7 Open Call Timeline

Open Call Submission Period	June 30th 2025 at 12:00 PM CEST - September 11th 2025 at 5:00 PM CET
Proposals Evaluation (Selection of third-party projects)	September-October 2025
Results Announcement	Late October 2025
Sub-Grantee Agreement Signature	November 2025
Deployment Phase	December 2025 – January 2027

TABLE 5: OPEN CALL 1 TIMELINE

8 Open Call Material – KIT Application

The AID4SME Open Call 1 support material is the following. All the documents are available on the project website (https://aid4sme.eu/open-call-1/).

- **Annex 1 - Guide for Applicants:** The present document. This document provides in detail the information to help apply to Open Call 1 containing a description of the open call rules, the modalities for application, the evaluation process, the scheme of the funding support, and how to submit a proposal.
- **Annex 2 - Technical Proposal Template:** Mandatory document for applicants to prepare and submit. (available at https://aid4sme.eu/open-call-1/)
- **Annex 3 - Online Application Form (for consultation):** The online application form, available on the F6S platform (for consultation).

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- **Annex 4 - Declaration of Honour (for consultation):** which declares that all conditions/rules of the open call are accepted by an applicant. This document will be filled out by the selected company in the contracting phase.
- **Annex 5 - SME Declaration (for consultation):** which evaluates the status of the SMEs participating in the call. This document will be filled out by the selected company in the contracting phase.
- **Annex 6 - Sub-Grantee Agreement Template (for consultation):** which provides a template of the sub-grantee agreement that the successful applicants will be requested to sign.

9 Points of Contact

The project consortium will also provide information to the applicants via the F6S blog so that the information (question and answer) will be visible to all participants. No binding information will be provided via any other means (e.g., telephone, or video calls).

- More info at: https://aid4sme.eu/open-call-1/
- Apply via: https://www.f6s.com/aid4sme-oc-1/apply
- F6S support team contact: support@f6s.com
- Online Q&A: https://www.f6s.com/aid4sme-oc-1/discuss
- Individual emails (Q&A): aid4sme.opencall@f6s.com

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ANNEX 1: Challenges Descriptions

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1 Combined AI and Data solutions for DATA COLLECTION

1.1 Augmented sensing solutions

Challenge and Context: Forces, stresses, torques, and power are direct indicators of a system's well-being. However, these quantities are typically expensive, difficult and intrusive to measure. Digital twins approach within AID4SME can help alleviate these hurdles for use cases inside and outside the consortium. Digital twins offer a paradigm shift where computational models of various complexities are merged in a coherent framework and linked to online measurement data available on a physical system. This paradigm allows for a hyper-realistic representation of process behaviour, enabling novel engineering applications and process improvements, such as virtual or augmented sensors. Augmented sensing uses cheap, readily available, non-intrusive, and robust physical sensors to collect data from the real asset component in a digital twin. The desired, yet unknown, quantities are estimated, resulting in a real-time/online virtual sensor fed with real measurement data enriched with physical insights.

Use Case and Expected Solution: Within the consortium, Arçelik requires an augmented sensing solution for its refrigerator production facility, which undergoes approximately 120 mold changes per month. Each change necessitates manual, iterative adjustments, causing about 60 tons of polyurethane waste and about 60 minutes of facility downtime per mold change. This results in approximately 5 million euros in annual costs due to production capacity loss. The solution will enable accurate monitoring of forces, stresses, or other relevant physical quantities during plastic mold changes in the refrigerator production line. It will provide real-time feedback and predictive insights to reduce manual intervention and iterative adjustments during mold changes, minimize polyurethane waste, and reduce facility downtime. For this industrial high-TRL application, Arçelik has foreseen the following Key Performance Indicators (KPIs): (i) First time-right adjustment of the mold; (ii) Reduce facility downtime by 15%; (iii) Decrease annual waste by 30 tons; (iv) reduction in energy consumption per mold change. These KPIs are initial indicative numbers and may evolve during the execution of the projects.

Besides this high-TRL application, KU Leuven has technology blocks available at TRL 4 and low-TRL playgrounds to develop and test augmented sensing solutions, specifically for mecha(tro)nic system level dynamics, and model-based augmented sensing in electro-thermo-mechanical applications in the manufacturing industry. For application on the low-TRL research lab playgrounds, the focus will be on the technological development of the augmented sensing solution together with the SME.

Call for SME Application Projects: SMEs are invited to propose a use case leveraging their own technology or solving their problems at hand, which will be further elaborated together with the consortium partners. Inspirational examples can be based on system identification, parameter estimation, force estimation, etc. The consortium offers low-TRL research lab playgrounds as well as one high-TRL industrial application (as detailed above). SMEs applying for this challenge should specify which TRL level they would like to target. For the industrial application, three consortium partners will support SMEs in developing an augmented sensing solution to optimize the mold adjustment phase, targeting difficult-to-measure quantities and ensuring a comprehensive understanding of the manufacturing process. The data will be fed to an AI-based digital twin decision support tool, enabling first-time-right adjustment of the mold by the operator.

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1.2 2D/3D image analysis for large Energy Infrastructure predictive maintenance

Challenge and Context: Timely scheduling maintenance or decommissioning of large energy infrastructures is challenging. Incorrect End-of-Life (EoL) predictions can lead to unexpected failures, unwanted downtime, and high costs. Grid operators aim to avoid these risks, but often maintenance and decommissioning occur too early, causing high waste and unnecessary costs. AI-supported 2D/3D vision analysis technologies can better predict the maintenance needs and EoL of energy infrastructures. A consortium partner seeks solutions to collect information for predictive maintenance of power lines and to improve decommissioning planning.

Use Case and Expected Solution: Red, Green, and Blue (RGB), thermographic, and multispectral/hyperspectral vision can be used for early identification of weaknesses and failures in energy assets and nearby structures. Different types of failures, such as defects, poor contact, insulation deterioration, or magnetic circuit faults, often manifest as temperature rises. Infrared thermography (IRT) is particularly suitable for fault diagnosis, while RGB is used to quantify surface integrity and detect external discontinuities. Studies have shown the effectiveness of photogrammetric inspection, presented as 3D profiles reconstructed from UAV-captured images. Multispectral/hyperspectral images provide more information than RGB alone, identifying issues like material degradation and biofouling. Currently, the partner LEITAT has technology bricks available for fusing these images with installed sensor data and historical O&M data at TRL 4.

Specifications for Use Case: the consortium partners will guide and mentor SMEs to develop a combined AI and data-based predictive model using image analysis. A dedicated combination of photonic and sensor technologies will be used to determine the asset's health conditions. These partners will assist SMEs in selecting the appropriate cameras and collecting the necessary 2D and 3D image data for AI-supported vision-based diagnosis. They will also support the AI-supported analysis of images, looking for early indicators of malfunctioning assets, corrosion, biofilm, etc. The analysis information, combined with data from installed sensors, O&M activities, and historical images, will be used to develop an AI-supported predictive model. In addition, one of the partners will support SMEs during the development, evaluation, and validation of the model. Based on the collected data, a set of assets will be identified for model validation, with at least one asset monitored during O&M actions to decide on continuity or decommissioning.

The TRL 7 image analysis solution will enable predictive planning for the maintenance and decommissioning of part of partner infrastructures leading to better predictions of asset useful life and resulting in environmental and cost benefits. Once demonstrated, the technology can be further developed and deployed for other infrastructures beyond the project's lifetime. For use cases outside the consortium, the results will lead to the development of predictive maintenance and decommissioning planning support tools, based on AI-supported 2D/3D image analysis and data fusion, demonstrated at TRL 7 for large energy infrastructure.

Furthermore, the key use case will involve **vegetation monitoring in transmission line corridors** using multispectral and hyperspectral imagery. The system will enable **automated recognition of vegetation types,** which will be essential for predicting growth rates and planning timely interventions. Additionally, the same imagery will allow for **assessment of vegetation's health,** helping to identify diseased or stressed plants that may pose a higher risk to infrastructure. This dual capability will support more accurate and proactive maintenance strategies, reduce the likelihood of service interruptions, and optimize resource allocation for vegetation management.

The selected third party is expected to contribute with the following:

1. **Vegetation Recognition in Transmission Line Corridors**: Utilizing multispectral/hyperspectral cameras, it shall be made possible to recognize vegetation types from imagery. This is important because different types of vegetation grow at different rates, making it easier to predict when intervention will be necessary.

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2. **Assessing Vegetation Health**: With multispectral/hyperspectral cameras, it shall be made possible to assess the health of vegetation from imagery. This is crucial because healthy vegetation poses significantly less risk to infrastructure compared to diseased or damaged specimens.
3. **Assessing Infrastructure Condition**: Using multispectral/hyperspectral imagery, it shall be made possible to determine the condition of infrastructure. Discussions indicate that it is possible to detect the amount of biofilm and dirt on insulation, identify corrosion, detect overheating, and more.
4. **Other Use Cases**: Additional applications may also be considered.

Key Performance Indicators:

- Prediction accuracy of AI models in identifying maintenance needs and failure risks, Reduction in false positives and false negatives in anomaly detection, Improvement in defect detection and classification compared to traditional methods, reduction in manual intervention required for maintenance planning, improvement in decision-making speed for decommissioning strategies (% accuracy of predictive maintenance model).
- Reduction in infrastructure failures resulting from environmental hazards, compliance with safety regulations and decommissioning best practices, decrease in CO_2 emissions by reducing unnecessary maintenance trips (% reduction in maintenance-related CO_2 emissions)
- Number of prevented accidents due to early hazard or failure detections in comparison to “classical” detections., number of workers trained in AI, data fusion, and predictive maintenance tools.

To be noted, the list of KPIs provided in this section is not exhaustive but rather indicative. Additional KPIs will be studied and can be integrated to ensure quality outcomes.

2 Combined AI and Data solutions for creation of INSIGHTS

2.1 Product-production Digital Twins

Challenge and Context: Traditional design cycle paradigms in manufacturing have been optimised to their limits, and further gains are expected from cross-stage optimisation through combined AI and Data solutions. Digital information is becoming available in large amounts during different stages of product design, manufacturing, useful life, and recycling. Digital twins enable the collection and comprehensive management of all digital information linked to a unique product asset, exploiting it for added value creation within the same stage at which the data was collected. Leveraging these technologies, the manufacturing industry is on the verge of fully reaching Industry 4.0’s digitalization potential, where digital twins play a central role at both the product level and at the production level. Manufacturers are striving to reduce their ecological footprints by minimising energy consumption, material use, and waste. AID4SME is committed to overcoming these challenges for use case owners both inside and outside the consortium.

Use Case and Expected Solution: Inside the consortium, Arçelik operates extruder processes to blend virgin plastic material with plastic scrap. Flaws in the mixing rate can lead to discolouration and cracking, generally caused by high ratios of recycled material. Arçelik seeks a product-production digital twin solution to optimise material mixing ratios based on real-time measurement of visual and mechanical properties of the different plastic source materials. This aims to increase the ratio of recycled plastic, enhancing sustainability while maintaining quality and reducing scrap. Additionally, Arçelik’s consumer electronics refurbishing factory, which refurbishes over 50000 products annually, seeks to reduce the amount of refurbished products by combining augmented sensing (cf. challenge 1.1) and a product-production Digital Twin to optimise End-of-Life Product Refurbishment processes by assessing the health and predicting the remaining lifespan of components. For this industrial high-TRL application, Arçelik has foreseen the following

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activities/Key Performance Indicators (KPIs): (i) improvement of existing sensors and integration of new ones in the extruder machine; (ii) integration of visual, dimensional (width, length, thickness) and mechanical quality control systems into the existing extruder machine; (iii) creation of a digital twin of the developed system; (iv) determination and control of optimal process parameters (screw, speed, mold and barrel temperatures, gear pump pressure, cooling water temperatures, material mixing ratios, etc.) using AI and data analysis; (v) reduction in maintenance costs, waste rates, and energy consumption; (vi) 5% increase (1200 tons) in recycled plastic content in Arçelik refrigerator products; (vii) resolving 95% of quality control issues; (viii) reduction in virgin material usage. This list is not exhaustive but rather indicative. Additional KPIs will be studied and can be integrated to ensure quality outcomes.

Besides this high-TRL application, KU Leuven has technology blocks available at TRL 4 and low-TRL playgrounds, namely a fully equipped injection moulding laboratory facility, to develop and test related solutions. This allows to link the manufacturing process to product quality in mecha(tro)nic applications. For application on the low-TRL research lab playgrounds, the focus will be on the technological development of a dedicated product-production simulation framework for injection moulding manufacturing processes.

Call for SME Application Projects: SMEs are invited to propose a use case leveraging their own technology or solving their problems at hand, which will be further elaborated together with the consortium partners. Inspirational examples can be based on system identification, quality control, process parameter optimisation, etc. The consortium offers low-TRL research lab playgrounds as well as one high-TRL industrial application (as detailed above). SMEs applying for this challenge should specify which TRL level they would like to target. For the industrial application, the consortium partners will guide and mentor SMEs to deploy a straight-through digitalization (STD) approach in the challenges. More specifically for this challenge, a product-production digital twin for their extruder processes for blending virgin and regrind plastic and masterbatch materials will be developed and demonstrated at TRL 6 at the high-TRL playground of Arçelik.

2.2 Digital Twin based lifespan analysis tool

Challenge and Context: Traditional design cycle paradigms in manufacturing have been optimised to their limits, and further gains are expected from cross-stage optimisation through combined AI and Data solutions. Digital information is becoming available in large amounts during different stages of product design, manufacturing, useful life, and recycling. Digital twins enable the collection and comprehensive management of all digital information linked to a unique product asset, exploiting it for added value creation within the same stage at which the data was collected. Leveraging these technologies, the manufacturing industry is on the verge of fully reaching Industry 4.0's digitalization potential, where digital twins play a central role at both the product level and at the production level. Manufacturers are striving to reduce their ecological footprints by minimising energy consumption, material use, and waste. AID4SME is committed to overcoming these challenges for use case owners both inside and outside the consortium.

Use Case and Expected Solution: Inside the consortium, Arçelik operates extruder processes to blend virgin plastic material with plastic scrap. Flaws in the mixing rate can lead to discolouration and cracking, generally caused by high ratios of recycled material. Arçelik seeks a product-production digital twin solution to optimise material mixing ratios based on real-time measurement of visual and mechanical properties of the different plastic source materials. This aims to increase the ratio of recycled plastic, enhancing sustainability while maintaining quality and reducing scrap. Additionally, Arçelik's consumer electronics refurbishing factory, which refurbishes over 50000 products annually, seeks to reduce the amount of refurbished products by combining augmented sensing (cf. challenge 1.1) and a product-production Digital Twin to optimise End-of-Life Product Refurbishment processes by assessing the health and predicting the remaining lifespan of components. For this industrial high-TRL application, within this challenge, the focus will be on a digital twin-based lifespan analysis tool, which enables Arçelik to determine the remaining life of parts and optimise their refurbishment processes. This will increase the repurposing of parts from discarded products as spare parts, adjust warranty periods and pricing for resold products and parts, and enhance overall sustainability of the refurbishment process by minimising waste and facilitating responsible

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and resourceful management of end-of-life products. Arçelik has foreseen the following activities/Key Performance Indicators (KPIs): (i) 20% reduction in waste from discarded parts; (ii) 15% increase in reused components; (iii) 5% reduction in warranty-related costs due to data-driven lifespan predictions; (iv) 30% improvement in refurbishment throughput; (v) checking the suitability of the spare parts and comparing the measurement results obtained on the part with production tests and modeling for life cycle determination; (vi) identifying returned products and parts with potential for recovery, creating end-to-end traceability and inventory system. This list is not exhaustive but rather indicative. Additional KPIs will be studied and can be integrated to ensure quality outcomes.

Call for SME Application Projects: SMEs are invited to propose a use case leveraging their own technology or solving their problems at hand, which will be further elaborated together with the consortium partners. Inspirational examples can be based on quality assessment and quality control. The consortium partners will guide and mentor SMEs to deploy a straight-through digitalisation (STD) approach in the challenges. More specifically for this challenge, a Digital Twin-based lifespan analysis tool will be demonstrated at TRL 6 at the high-TRL playground of Arçelik. This tool will determine the remaining life of products and parts, enabling the partner to increase the repurposing of parts from discarded products as spare parts, adjust warranty periods and pricing for resold products and parts, and enhance the overall sustainability of the refurbishment process by minimizing waste and facilitating responsible and resourceful management of end-of-life products.

2.3 Energy system Digital Twin decision support tool

Challenge and Context: Grid operators for transmission and distribution increasingly face grid balancing challenges due to growing energy demand and decentralized renewable energy production. In addition, increased demand for integration of additional EV charging stations further complicates microgrid management and influences local grid stability. To balance power generation and demand, various energy storage technologies can be used. However, energy conversion and storage equipment incur capital and operational expenditures that affect the final price of electric energy. Optimal sizing of local renewable sources and energy storage is crucial for achieving an economically optimized energy system. Due to numerous variables, such as time profiles of energy consumption, energy generation, and dynamic pricing, and their nonlinear relationships, optimal solutions cannot be obtained analytically. This challenge seeks AI and Data solutions for a Digital Twin-based decision support tool to optimally size and control smaller parts (microgrids) of the energy system.

Use Case and Expected Solution: The expected solution should enable the grid operator to determine the most optimal local energy system (microgrids) sizing that will support EV mobility (inclusion of new EV charging stations) and its optimal mode of operation. The proposed sizing and operation solution should lead to a reduced cost for energy production, reduced energy storage system CAPEX, reduced wastage of renewable energy and possibility to integrate new EV charging stations without destabilizing the local grid.

A Digital Twin (simulation model) structure for local energy systems is available at the partner's facility. Various prototype tools for manual and automated optimization have already been developed and tested at TRL 4. This low TRL level playground includes modules for energy consumption (including EV charging), generation (including local renewable sources), prices of electric energy from the grid, and energy storage systems (battery, electrolyser, fuel cell, hydrogen, pumped hydro). The provided Digital Twin enables simulation of the energy balance over a desired time period (typically an entire year) and observing economic results as a function of equipment sizes and prices. Another consortium partner is a grid operator providing a real-world microgrid playground with actual microgrid components and energy consumption/production measurements.

Specifications for Use Case: The low-TRL playground **can** be used by an SME to develop a Digital Twin-based decision support tool for optimal sizing of the microgrid components. The digital twin can also be

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used to experiment and test the microgrid control algorithms for different scenarios. The prepared solutions will be verified at the high-TRL playground with real-world data.

The selected third party is expected to contribute with the following:

- Develop an optimization algorithm for optimal sizing of a microgrid components using a microgrid Digital Twin
- Develop a microgrid grid energy control algorithms using predictions of energy needs and production
- Implement and test the developed solutions in a digital environment with real world data and for different scenarios

Key Performance Indicators:

Improved scaling of the energy storage components for the selected microgrid setup is envisioned to:

- Decrease CAPEX of energy storage systems (% reduction in CAPEX for energy storage),
- Improve local consumption of renewable energy (% increase in renewable energy self-consumption),
- Increase number of integrated EV charging stations while not affecting grid stability (% improvement in grid stability metrics).

To be noted, the list of KPIs provided in this section is not exhaustive but rather indicative. Additional KPIs will be studied and can be integrated to ensure quality outcomes.

3 Combined AI and Data solutions for DECISION SUPPORT

3.1 Digital Twin-Enabled Smart Production Process Planning Tool

Challenge and Context: Production planning in manufacturing is still mainly driven by manual inputs and spreadsheet-based tools, resulting in fragmented workflows, low planning agility, and a high risk of reactive decision-making. This legacy approach makes it difficult to anticipate demand fluctuations, optimize resource allocation, or align production capacity with customer needs. One critical shortfall is the underutilization of historical customer demand data, such as order volumes, frequency, and variability across part numbers and time. Without a systematic analysis of this data, manufacturers struggle to identify recurring demand patterns, classify demand profiles, or tailor planning strategies accordingly. This challenge proposes the development of a Digital Twin-enabled production planning tool that harnesses historical customer demand data to simulate, evaluate, and refine planning strategies. The tool will integrate AI-based optimization algorithms alongside ABC/XYZ approach to entwine market segmentation strategies with product demand forecasting based on demand volume and volatility. These insights can inform planning priorities, buffer strategies, and resource allocation rules. By learning from past order behaviors, the tool will enable manufacturers to anticipate future demand scenarios, build resilient plans, and reduce inefficiencies across the production system.

Use Case and Expected Solution: An aluminum part automotive manufacturing company seeks to optimize its operational planning by leveraging structured historical customer demand and production data. The company aims to overcome typical industry challenges such as inefficient resource utilization, demand volatility, unbalanced workloads, and reactive planning processes. This requires a solution that uses historical demand patterns and future demands to build more robust, flexible, and data-driven planning strategies. To support this, we offer realistic, near-industrial low-level playgrounds such as the MOVE platform, and Smart and Agile Assembly Lab, where planning concepts, models, and tools can be developed, tested, and validated in a controlled yet complex manufacturing environment.

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The tool developed through this challenge will analyze customer demand trends over time to uncover patterns and enable the grouping and classification of customers based on their demand characteristics. By examining past planning and production outcomes, the tool will identify inefficiencies and missed optimization opportunities. It will integrate AI-based planning algorithms to support data-driven decision-making. In addition, the tool will apply classification methods (e.g., ABC/XYZ) to tailor planning strategies according to demand data. Planners will be able to run scenario-based simulations using historical data and future demand, allowing them to proactively evaluate, compare, and refine planning alternatives before implementation.

Specifications for Use Case: This platform will provide a smart planning tool to optimize and support planning decisions before execution, reducing reliance on reactive adjustments, and improving overall resource utilization and performance. Two consortium partners will support SMEs in defining the Digital Twin-enabled smart production process planning tool, providing both AI expertise and industry insights. This will advance Digital Twin decision support developments.

The selected third party is expected to contribute with the following:

- Customer demand analysis and classification modules.
- Identification of planning inefficiencies using historical data.
- AI-powered simulation capabilities to assess and compare planning alternatives.

Key Performance Indicators:

- Planning Accuracy Improvement (%)
- Demand Forecasting Classification Accuracy (%)
- Reduction in Manual Planning Adjustments (%)
- Replanning Frequency (per week/month)
- Reduction in overproduction or stockouts (%)
- Increase in OEE (%)

To be noted, the list of KPIs provided in this section is not exhaustive but rather indicative. Additional KPIs will be studied and can be integrated to ensure quality outcomes.

4 Combined AI and Data solutions for AUTOMATION

4.1 Automated energy management for parts production

Challenge and Context: The challenge is to derive a prototype of a shopfloor module for integration and smart energy management of the energy-intensive production equipment. Automated and energy-aware management of the production processes can have a significant positive impact on energy-intensive production industries. One of the approaches for overall energy optimization is to monitor and proactively manage production machines' states according to the production plan. Optimized timings of the special machine modes, such as start-up, shut-down and stand-by, will reduce the unwanted high-power idle times of the machines. Such automated machine control should, on the one hand, ensure that machines are prepared and ready for the execution of the production schedule, and on the other hand, it should minimize the overall energy consumption needed for transitions of machines from idle or stand-by modes to operating modes.

Use Case and Expected Solution: Predictability of the energy consumption profile is needed to optimize modes of machine operation. Energy consumption prediction models for production processes exist and are used in practice, but they are manually developed and tailored for specific production processes, considering particular energy consumers. Manual design of such models requires expert knowledge of process and energy modeling, is time-consuming and expensive, and limits transferability between different processes and reusability. A partner has technology blocks available at TRL 4 and a low-TRL playground for automatic determination of the relationship between energy consumption time profile and production

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plans, based on AI and machine learning methods using historical data about production plans and related energy consumption profiles. This automatic learning capability enables wide usage of the method across different production processes. The data-based approach also allows modeling the effects of external conditions (temperature, weather, season, etc.).

The expected solution should enable the industrial partner of the consortium to automate control over energy intensive operation machines. Optimized control over the operation states of the machines (e.g., pre-heat, standby, off-mode) should be in accordance with the actual production plan, while minimizing the overall energy consumption. The industrial consortium partner is currently enabling energy monitoring of all key infrastructure equipment for aluminum casting and automotive parts production. As the next step, this partner aims to implement an automated machine management tool for the plant's infrastructure. The aluminum casting production consists of a number of machines that are high energy consumers. In addition, varying preparatory start-up times are required to reach nominal operational conditions. Currently, there is no unified and vendor neutral approach for centralized monitoring and management of machines. Consequently, it happens that particular machines stay switched on and consume electric energy in periods when production is not running, which can be during night periods or pause periods. This leads to electric energy waste, increased costs and increased pollution due to excess electric energy consumption. The expected solution should automatically monitor and manage machines' states according to the central production time plan. This includes automatic startups and automatic shutdown or entering various standby modes.

Specifications for Use Case: The consortium partner will guide and mentor SMEs to use existing building blocks for automated energy management of production processes and further develop and implement these technologies in real production environments of use-case owners. For the partner use case, automated energy management of their production plant demonstrated at TRL 7 will enable them to automate control over high energy consumption assets according to the production, leading to minimization of energy related costs, while not affecting the execution of the planned production activities.

The selected third party is expected to contribute with the following:

- Develop a smart energy management strategy and algorithm based on the energy consumption models of the machine modes
- Develop a module/system for monitoring and management of high energy intensive machines
- Demonstration of the prototype on the industrial setup

Key Performance Indicators:

- Accuracy of predicted energy consumption for the observed production operation (% accuracy of energy consumption forecasts).
- Reduction of daily energy consumption per produced part, for the controlled machine/operation (% reduction in energy consumption per part).
- Production schedule adherence, indicating how closely production adheres to the planned schedule for the controlled production operation (operation delay time).

To be noted, the list of KPIs provided in this section is not exhaustive but rather indicative. Additional KPIs will be studied and can be integrated to ensure quality outcomes.

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4.2 Automated energy management for battery production

Challenge and Context: Automated prediction and optimization of electric energy consumption in energy-intensive production processes can have a significant positive impact. Based on factory daily production plans, the electric energy consumption time profile can be predicted. Subsequently, the time distribution of production steps can be optimized to keep the electric energy time profile within limits determined by the electric grid operator. This helps industries and grid operators balance their grids and maximally exploit the potential of renewable energy sources. AID4SME is flexible in implementing such automated energy management for different industrial use case owners both inside and outside the consortium. A partner is monitoring their energy-intensive battery production processes and attempts to model the consumption. Optimization remains a challenge, and this partner seeks an automated energy management solution on top of their energy and production models.

Use Case and Expected Solution: Energy consumption prediction models for production processes exist and are used in practice, but they are manually developed and tailored for specific production processes, considering particular energy consumers. Manual design of such models requires expert knowledge of process and energy modeling, is time-consuming and expensive, and limits transferability between different processes and reusability. A partner has technology blocks available at TRL 4 and a low-TRL playground for automatic determination of the relationship between energy consumption time profile and production plans, based on AI and machine learning methods using historical data about production plans and related energy consumption profiles. This automatic learning capability enables wide usage of the method across different production processes. The data-based approach also allows modeling the effects of external conditions (temperature, weather, season, etc.).

The solution enables to balance energy consumption and optimize renewable energy consumption. This will result in more efficient energy management, reduced operational costs, and enhanced overall sustainability.

Specifications for Use Case: The consortium partners will guide and mentor SMEs to use existing building blocks for automated energy management of production processes and further develop and implement these technologies in real production environments of use-case owners. The partner use case and use cases outside the consortium, automated energy management and optimization demonstrated at TRL 7) will enable the partner and other use-case owners to balance their energy consumption.

The selected third party is expected to contribute with the following:

- Provide an Energy Management System, based on energy consumption models and machine models.
- Provide a monitoring and management module for the most energy intensive machines
  Be able to demonstrate the prototype at pilot scale.

Key Performance Indicators:

- % increase in renewable energy integration
- % reduction in energy cost per unit
- % reduction in peak energy demand

The list of KPIs provided in this section is not exhaustive but rather indicative. Additional KPIs will be studied and can be integrated to ensure quality outcomes.

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4.3 Semi-automated EV battery disassembly for recycling

Challenge and Context: EV batteries across manufacturers and cars vary significantly, with each battery type having its own cables, bus bars, modules, and different types of cells inside. This variability makes the automation of battery dismantling for recycling purposes challenging. Additionally, current EV batteries subject to recycling are mainly Li-ion based, posing hazard risks for recycling processes. Automating each process for each battery type is time-consuming and costly. Battery recycling companies face these challenges, which AID4SME can overcome for use-case owners both inside and outside the consortium. Inside the consortium, a partner aims to implement semi-automatic dismantling of batteries cells and modules. As the dismantling would be implemented on not-good batteries coming out of the production line, automation could be envisioned since battery cells and modules design would be known and controlled. This would enable the creation of an in-house circular input stream for the resources needed for battery production.

Use Case and Expected Solution: Currently, different battery recycling developments are ongoing, using collaborative robots. However, these activities mainly focus on automating the dismantling of one type of battery, with limited applicability to other types of batteries with different geometries and internal distributions. Another partner has a laboratory for battery dismantling with an industrial robot at TRL 4, specifically focusing on developing a flexible battery dismantling process. This partner has several technology blocks at TRL 4, using computer vision and AI technologies from other areas, supporting the development of dismantling operations on different batteries without specific robot programming for each.

The solution enables upscale the circular input stream for battery production and reduce hazard risks. This will result in more efficient battery recycling processes, better utilization of resources, and enhanced overall sustainability.

Specifications for Use Case: The consortium partner will guide and mentor SMEs to develop a robot cell for semi-automatic battery dismantling of various EV battery types, extending to overall mechatronic system demanufacturing approaches. In this solution, a human operator manually performs tasks the robot cannot, while the robot handles repetitive and dangerous operations such as opening the battery pack while charged or picking up heavy components. For operations that cannot be automated, the user can control the robot using teleoperation, moving the robot and indicating the position using a VR device. Solutions will be demonstrated for the partner's use case at TRL 6. This will enable to implement an EV battery type-agnostic, semi-automated dismantling process, upscaling the circular input stream of resources needed for their battery production while maintaining low hazard and safety risks for operators.

The selected third party is expected to contribute with the following:

- **Battery Assessment**
  Evaluation of battery performance, capacity, and overall condition.
- **Safety Measures for Battery Handling**
  Protocols and best practices to ensure safe handling, storage, and transportation of batteries.
- **Battery Defect Detection**
  Identification of manufacturing or operational defects in batteries using diagnostic tools and inspection methods.
- **Battery Health Monitoring**
  Assessment of battery state-of-health (SoH) using sensors and diagnostic data (e.g., temperature, voltage, internal resistance).
- **Battery Charging and Discharging Methods**
  Procedures and technologies for safe and efficient charging and discharging of batteries.
- **Decision-Making for Second Life, Reuse, or Recycling**
  Criteria and processes for determining whether a battery should be reused, repurposed for second-life applications, or sent for recycling.

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Key Performance Indicators:

- Percentage of dismantling operations performed autonomously by the robot, reduction in manual intervention compared to traditional dismantling methods, value of battery dismantled in a week, percentage of weight battery recovery, accuracy of robotic operations, scalability potential (% of dismantling steps automated, % reduction in dismantling time per battery).
- increase in the number of reusable/recyclable materials recovered, reduction in waste and environmental impact from battery dismantling (% of materials recovered for reuse, % increase in recyclable material yield)
- demonstrate progress in labour conditions, improvement in ergonomic conditions for workers, adoption rate of teleoperation, gender diversity (% reduction in manual labor exposure to hazards).

To be noted, the list of KPIs provided in this section is not exhaustive but rather indicative. Additional KPIs will be studied and can be integrated to ensure quality outcomes.

4.4 Co-bot refrigerator door assembly solutions

Challenge and Context: The development of new automation technologies for the manufacturing industry directly contributes to efficiency, safety, and human factors. Modular, reconfigurable, energy-efficient, and collaborative robots can enable industries to optimize their operations, reduce waste, lower their environmental impact, and improve human operator job attractiveness. The white goods factory of a partner is one area where collaborative robots can make a significant difference. This partner will provide a use case for their refrigerator production line, where refrigerator gaskets of different shapes and sizes are installed on refrigerator doors. Manual installation of the refrigerator gaskets poses ergonomic challenges, resulting in inefficiencies and potential product rejections. Partial (co-bot) automation of gasket installation, particularly flexible elastomer gaskets, presents unique challenges that require the integration of collaborative robotics and AI to optimize the installation process. This ensures precision, safety, and adaptability to the deformable nature of elastomers, as the co-bot must apply the right force on the flexible material without causing deformation. The partner seeks a co-bot solution to overcome these challenges while aligning with the Green Deal's focus on promoting worker well-being and safety.

Use Case and Expected Solution: Another partner has a catalogue of developed technologies validated in the lab (TRL 4), building on results from previously funded EU projects related to collaborative assembly. These technologies will be combined with 2D/3D video analysis technology blocks. The partner has several low-TRL playgrounds based on these technologies.

The solution enables to improve efficiency, operator ergonomics, and inclusiveness, and reduce waste. This will result in more efficient production processes, better utilization of machinery, and enhanced overall operational efficiency. The expected solution will advance the catalogue of technologies and apply them in a working solution for the gasket installation use-case at TRL6. This will enable to improve efficiency, operator ergonomics, and inclusiveness, and reduce waste. This will result in more efficient production processes, better utilization of machinery, and enhanced overall operational efficiency. It will be demonstrated at TRL 6 and will offer the means to be advanced to even higher TRL, including with all safety requirements for factory deployment.

The AID4SME solutions will foster a sustainable and inclusive digital transition that benefits both manufacturing companies and society at large.

Specifications for Use Case: The consortium partner will guide and mentor SMEs to further develop the technology bricks using their low-TRL playground and adapt these technologies for deployment in other industry sectors. For the “bring your own use-case” challenges, co-bot solutions will be demonstrated at

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TRL 5-6. This will enable improved efficiency, operator ergonomics, and inclusiveness, decrease waste, and increase the longevity of refrigerator doors through enhanced stability of gasket installation quality.

The selected third party is expected to contribute with the following:

1. Develop a co-bot-assisted gasket installation solution
2. Integrate AI-based perception and control systems to allow the co-bot to adapt to different gasket shapes and models.
3. Ensure compliance with safety and ergonomic standards, by reducing physical strain on human workers and improving workplace safety with co-bot working.
4. Demonstrate human-robot collaboration capabilities, where the co-bot supports rather than replaces the human operator, ensuring intuitive interaction and task sharing.

The SMEs are expected to deliver:

1. **A functional prototype or demonstrator** of a semi-automated gasket installation system using a collaborative robot and AI.
2. **Technical documentation**, including system architecture, control algorithms, safety assessments, and integration plans.
3. **Performance evaluation results**, showing improvements in precision, cycle time, safety, and operator workload compared to manual processes.
4. **A roadmap for scalability and industrial deployment**, including environmental and economic impact assessments in line with the Green Deal.
5. **Training and user manuals** to ensure the solution can be safely and efficiently used by operators with minimal retraining.

Key Performance Indicators:

- Demonstrate effective and flexible autonomous processes (% increase in assembly precision).
- Ensure the safety of workers in the vicinity.
- Improved efficiency: reduce the number of workers required at the production line (% increase in production line efficiency).
- Operator ergonomics: reduce operator/worker effort, as they will be able to focus on other tasks.
- Increase quality: robotized processes can more easily detect errors in production during the process itself (% reduction in installation errors).
- % reduction in waste due to assembly defects

To be noted, the list of KPIs provided in this section is not exhaustive but rather indicative. Additional KPIs will be studied and can be integrated to ensure quality outcomes.

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