Circular TwAIn

AI Platform for Integrated Sustainable and Circular Manufacturing

Deliverable

D1.2 - Ethical Analysis, Governance and Guidelines – 1st version

Actual submission date: 29/12/2022

Project Number:	101058585		
Project Acronym:	Circular TwAIn		
Project Title:	AI Platform for Integrated Sustainable and Circular Manufacturing		
Start date:	July 1st, 2022	**Duration:**	36 months

D1.2 Ethical Analysis, Governance and Guidelines – 1st version			
Work Package:	WP1		
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Due date:	31/12/2022		
Deliverable Type:	OTHER	**Dissemination Level:**	PU
Version number:	1.0		

Revision History

Version	Date	Author	Description
0.1	18/10/2022	EAI	Initial ToC
0.2	03/11/2022	EAI	Final ToC
0.3	15/12/2022	EAI	Deliverable ready for Peer Review and Quality Check
0.4	20/12/2022	ENG, INTRA	Peer Review and Quality Check
0.5	22/12/2022	EAI	Official release of the document
1.0	29/12/2022	ENG	Final Coordinator review before submission

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Definitions and acronyms

A/IS	*Ethics of Autonomous and Intelligent Systems*
AI	*Artificial Intelligence*
ALLEA	*All European Academies*
ALTAI	*Assessment List for Trustworthy Artificial Intelligence*
CA	*Consortium Agreement*
CCTV	*Closed-Circuit Television*
CI	*Collaborative Intelligence*
DPO	*Data Protection Officer*
EAB	*Ethics Advisory Board*
EC	*European Commission*
EDPIA	*Ethics and Data Protection Impact Assessment*
EFFRA	*European Factories of the Future Research Association*
ELSEC	*Ethical, Legal, Socio-Economic and Cultural*
EM	*Ethics Mentor*
EP	*Ethical Policy*
EPM	*Ethics Pilot Manager*
EU	*European Union*
GA	*Grant Agreement*
GDPR	*General Data Protection Regulation (Regulation EU 2016/679)*
HLEG	*High Level Expert Group on AI*
HRIA	*Human Rights Impact Assessment*
IEEE	*Institute of Electrical and Electronics Engineers*
OSAI	*Observatory on Society and Artificial Intelligence*
PC	*Project Coordinator*
SME	*Small Medium Enterprise*
TBC	*To be confirmed*
TC	*Technical Coordinator*
WP	*Work Package*

Disclaimer

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Executive Summary

This document describes the Circular TwAIn Ethical Policy (EP) and the holistic and comprehensive Project's methodology towards ensuring the trustworthiness of its outcomes and activities.

As regards the former, it consists of an outline of both the Ethics & Fairness – by Design-and-by-Default Approach and the Gender-sensitive approach, followed by details on how the Consortium plans to ensure inclusiveness and research integrity, as well as it will prioritize human well-being and flourishing. Furthermore, the EP defines the ethics procedures to be implemented, after the due fine-tuning, by the industrial pilots in relation to the involvement of humans in the research activities and the collection and processing of personal data during the execution of the testing activities. The samples of the Information Sheet and Informed Consent are also provided. The EP also sets the basis of the Ethics and Data Protection Impact Assessment Methodology that will be conducted in relation to the Circular TwAIn pilots.

As regards the latter, the transversal nature of legal and ethics-related aspects within the workplan is depicted, highlighting the interrelations and synergies that are and will be sought between different tasks and work packages. In addition, key initiatives and sources relevant in relation to the ethical and trustworthy AI paradigm are briefly depicted, such as Ethics Guidelines for Trustworthy AI and the findings and insights of other key projects and initiatives for ethical and trustworthy AI, the AI4EU Observatory on Society and Artificial Intelligence (OSAI), IEEE Global Initiative on Ethics of Intelligent and Autonomous Systems and the Spanish Regulatory Sandbox on AI.

1 Introduction

1.1 About this deliverable

This deliverable is directed to set the Circular TwAIn Ethical Policy to be followed by the Consortium towards the design, development and deployment of its technological breakthroughs and piloting activities in a legally compliant and ethically-sound manner, describing the ethics-by-design-and-by default paradigm, the focus on human well-being, the ethics-related responsibilities and ethical procedures and sample consent forms and information sheets, as well as its gender-sensitive approach and its attention to inclusiveness and research integrity and the ethics and data protection impact assessment methodology for project's pilots. It also provides an overview of the holistic vision and steps towards ensuring trustworthiness and ethically soundness in Circular TwAIn.

1.2 Document Structure

The deliverable is structured as follows:

- Section 2 comprises the Ethical Policy of the Project, providing details on the Ethics & Fairness – by Design-and-by-Default Approach and on the Gender-sensitive approach and the attention to inclusiveness and research integrity, defining the procedures that will be followed during the piloting activities to recruit research participants and consent procedures as well as setting the basis of the Ethics and Data Protection Impact Assessment Methodology that will be conducted in relation to the Circular TwAIn pilots.

- Section 3 describes the holistic and comprehensive Project's methodology towards ensuring the trustworthiness of its outcomes and activities, lingering over the transversal nature of legal and ethics-related aspects within the workplan of the projects and the commitment to adhere to the principles of the Ethics Guidelines for Trustworthy AI and the findings and insights of other key projects and initiatives for ethical and trustworthy AI.

- Section 4 draws conclusions.

- Annex I includes the sample Information Sheet.

- Annex II includes the sample of the Informed Consent.

2   Circular TwAIn Ethical Policy

This section contains the Ethical Policy (EP) of the Project, including the description of the ethical procedures which will be followed by the Consortium for instance in relation to human participation in the experiments, as well as the oversight responsibilities and the samples of the Information Sheet and the Informed Consent. The EP also describes the ethics and privacy by-design-and-by-default approach and includes key considerations on how we intend to ensure a gender-sensitive methodology, inclusiveness and research integrity, besides setting the basis for the development of a comprehensive Ethics and Data Protection Impact Assessment methodology to be used within Work Package 6 "Industrial Pilots & Circular Manufacturing Experimentations".

2.1 Ethics & Privacy-by-Design-and-by-Default

One of the main pillars of Circular TwAIn Ethical Policy is the Ethics and Privacy by design approach.

Ethics by Design was defined by the EC as the attention and implementation, from the very beginning of the design process, of ethical principles and legal mandates. In the Horizon 2020 SIENNA Project [1] and SHERPA Project [2] it was explored what ethics by design principles and methods might look like, developing ethics by design principles and concrete methodologies for the new Horizon Europe programme, in particular for the development of AI systems.

This approach is strongly interconnected with the value-sensitive design, which flourished since the 1990s following the pioneering work of Batya Friedman [3], as well as with the fairness principle, mentioned by the GDPR itself.

The fairness principle requires to respect loyalty and good faith in the design, development, deployment and, above all, in the use of the AI system and in particular in relation to the personal data processing: in other words, personal data must be used in a fair way, avoiding any handling that is unduly detrimental, unexpected or misleading to the individuals concerned or that could have an adverse impact on them. Likewise, the development, deployment and use of any AI system should ensure the equal and just distribution of both benefits and costs, avoiding unfair bias, discrimination and stigmatization for individuals and groups. It also relies on equal opportunity in terms of access, for instance, to services and technologies, and on the avoidance of any situation where AI leads to people being deceived or unjustifiably impaired in their freedom of choice. The fairness principle also asks for respecting the principle of proportionality between means and ends and the adequate balance between competing interests/objectives at stake.

This approach is a straightforward requirement for Circular TwAIn technological artefacts, both in terms of ensuring individuals' privacy and real control over their data, and in terms of promoting their well-being and empowerment. From a procedural perspective, it is necessary to ensure, on the one hand, that the individuals can exercise their rights in an effective manner (as for data protection, they are rectification, erasure, object, etc.), and, on the other hand, that they have the possibility to "contest and seek effective redress against decisions made by AI systems and by the humans operating them", which relies on the accountability of the systems and on the explicability of the decision-making processes.

In Circular TwAIn, the efforts will be directed to move from ethical values to practical solutions via their operationalization and materialization of EU human factors in our technology (dignity, human flourishing, comfort, well-being and empowerment, inclusiveness, …).

As regards the Privacy- by-Design Approach, which is incorporated by the GDPR, it requires addressing the design process of the technological artefacts putting the privacy principles into it from the very beginning and throughout the whole process. The seven privacy principles, according to Cavoukian [4], are:"1. **Proactive not reactive** – preventative not remedial 2. **Privacy as the default setting** 3. **Privacy embedded into design** 4. **Full functionality** – positive-sum, not zero-sum 5. **End-to-end security** – full lifecycle protection 6. **Visibility and transparency** – keep it open 7. **Respect for user privacy** – keep it individual and user-centric".

The Consortium will take into account each of them in the design, development and/or adaptation of Circular TwAIn tools and components, so that to ensure to effectively implement the privacy-by-design approach, towards building trust and advancing data privacy. In addition, the partners will also follow the Privacy-by-Default paradigm, which asks to deliver the maximum degree of privacy by ensuring that personal data are automatically protected, "by default", without the need of any action from the individual.

2.2 Prioritizing human well-being in Circular TwAIn

One of the key priorities for Circular TwAIn Consortium is to contribute to the improvement to the maximum extent of the well-being, flourishing, safety and empowerment of the operator and, more in general, of the human being, in line with the human-centric approach.

In this direction, the due attention will be given to the indications and guidelines on **human-centricity** depicted by the **European Factories of the Future Research Association (EFFRA)** [5]. These sources state that future manufacturing companies need to be proficient in assisting ageing, disabled and apprentice operators and in enhancing working capabilities in a fully inclusive manner. This also includes, on the one hand, the compensation for age-, disability-, and inexperience-related limitations of operators and, on the other hand, the adoption of methods and tools for a continuous adaptation of the workplace to their physical, sensorial and cognitive capabilities. Advanced human–machine interfaces for workers will be also sought with the goal of strengthening the huge potential of qualities of human beings. The following aspects need to be taken into account:

"(i) usability and the related learning process;

(ii) physical, sensorial and cognitive interaction; and

(iii) fulfilment of safety and health conditions during human–machine interaction".

This is perfectly aligned with the Collaborative Intelligence paradigm, where the synergy between human and autonomous machines sharing the same workspace and workpieces in a collaborative manner is a critical factor. This paradigm, in fact, asks moving beyond the safeguard of human values and ethical principles towards ensuring that the operator is empowered by machines, conceived as individuals' capability multipliers.

The Consortium will also strongly refer to the **AI IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems** (A/IS) [6] and to the "Ethically Aligned Design, a

vision for prioritizing Human Wellbeing with Artificial Intelligence and Autonomous Systems" [7]. This states that "By aligning the creation of AI/AS with the values of its users and society we can prioritize the increase of human wellbeing as our metric for progress in the algorithmic age".

In particular, we will follow the first international standard focused on wellbeing, the IEEE Standard (Std) 7010-2020 Recommended Practice for Assessing the Impact of Autonomous and Intelligent Systems on Human Well-being, which is part of the IEEE 70xx series [8].

It investigates the impact of AI and autonomous and intelligent systems in general on human well-being for incorporating well-being factors throughout the lifecycle of AI, key guidance for the designers, developers and uptakers of these technologies. It goes beyond technical fixes to consider the full social/organizational context of the AI application.

The key ethical dilemmas and pressing concerns surrounding AI technology and its fast-changing developments in the manufacturing ecosystem will be investigated and tackled, ranging from further concentration of wealth and power, to the risk of leaving low-skilled workers behind, to the risk of exacerbating inequality or continuing existing biases.

The partners will monitor and evaluate human comfort and well-being and will take appropriate actions when necessary, seeking to inspire confidence in the potential of AI and to build trust as a prerequisite in harnessing AI potential.

The safety, empowerment and flourishing of the operator will be put at the centre of the technological development and validation activities, promoting an innovative and trustworthy AI respecting human rights and democratic values and capable of a better valorisation of the huge potential of qualities of human beings, continuously adapting workplaces to their physical, sensorial and cognitive capabilities.

Considering the human-centric approach and the aim to maximize the operator's wellbeing and flourishing within Circular TwAIn, we'll explore the use of the well-being indicators for the AI-empowered workplace in Circular TwAIn pilots.

This attention to the well-being perspective and indicators in the design of the technological artefact and in their adoption withing the pilot operations is meant to complement and extend the other prominent tools relevant to ensure and assess the social and ethical impacts of AI within Circular TwAIn, such as the Human Rights Impact Assessment.

This could highlight any potential areas for improvement, so that the optimal level of health and wellbeing is achieved within the organisation by relying on CI solutions for the benefit also of the employees' satisfaction.

2.3 Oversight responsibilities and ethics-related roles

The following oversight figures and ethics-related roles have been foreseen:

- Ethics Advisory Board (EAB)

- Ethics Mentor (EM)

- Ethics Pilot Managers (EPM)

Besides other functions and responsibilities, they will define, implement and/or monitor the adherence to Horizon Europe ethical mandates and any other relevant ethical guidelines,

as well as legal compliance, including GDPR. Their role is functional to enhance the quality of research and to strengthen its likely social impact.

Ethics Advisory Board

The Consortium set-up a multidisciplinary Ethical Advisory Board (EAB), familiar with the Ethics Guidelines for Trustworthy AI and other EU ethical source, as well relevant social-technical aspects. The composition covers multidisciplinary backgrounds such as human factors, ethics and AI research, socio-technical aspects. The member of EAB members should have expertise, knowledge and/or experience on one or more of these topics: human factors, data ethics, AI ethics, privacy, data protection, societal issues, Trustworthy AI and Human-AI Collaboration.

It consists of three experts from the Project team and three external advisors. Currently, the already appointed members are as follows:

Table 2-1: Circular TwAIn Ethics Advisory Board

Name	Contact Details	Short-bio
Marina Cugurra	marina.cugurra@expertai-lux.com	She is a lawyer specialised in the R&I projects, in particular in legal issues of new technologies and Information Society (e.g. AI, GDPR, data ownership,…), with a Ph.D. Degree at the "Telematics and Information Society" Ph.D. School in University of Florence. She is also an expert in ethical and societal themes related to ICT research and technological developments. She is serving as independent Ethical Expert in European Commission and European Defense Agency. Consolidated experience in national projects and international and European projects. Scientific collaboration with CNIT and CNR - ITTIG. Legal Advisor in the R&I Division of multinational companies. Contribution to the activities of the legal working groups of Eu-wide initiatives (EU Blockchain Observatory Forum,…) and Chair of the Ethics, Data Protection and Privacy (EDPP) Task Force of the "Citizen's Control of Personal Data" Initiative within Smart City Marketplace.
Marta Pinzone	marta.pinzone@polimi.it	Marta Pinzone is assistant professor at the Department of Management Engineering of Politecnico di Milano. Her interdisciplinary research interests are at the intersection of human resource management, sustainability and digital innovation. She is interested in investigating organizational and technological innovations that can improve economic, social and environmental outcomes at multiple level of analysis

		(individual and collective) and the people-centred multi-level mechanisms through which these effects materialize. In this respect she has been involved in different pan-EU research and education projects, e.g. SO SMART, MAN-MADE, Sector Skills Strategy in AM, Manuskills, HiAI, BEinCPPS, Smart4Europe2. She has been member of "Osservatorio Industria 4.0" of the School of Management of Politecnico di Milano and carried out a collaborative research on the "Jobs & Skills 4.0" within the observatory. Since 2019 she has been collaborating with the World Manufacturing Foundation as member of the Editorial Board of the World Manufacturing Report (2019 and 2020) and as coordinator of the Young Manufacturing Leaders Network Initiative (2020-ongoing)
Tuğçe Zengil Oturakkaya	tugce.oturakkaya@socar.com.tr	Project Management Office Supervisor at SOCAR Turkey Research and Innovation. Consolidated experience in Contract Process Management, IPR, Industry-University Collaborations, Implementation of European research and innovation projects under Horizon 2020, Horizon Europe, EUREKA, EUROGIA etc. on AI and other topics.

The additional three members will be identified and appointed in the next months.

The Board is in charge of the ethical oversight of the Project research activities and it will attend periodic calls (one every 4 months) and contribute to the ethics reporting. The Board will review and analyse Project's technology under development and the use cases to identify all potential legal and socio-technical obstacles as early as possible, propose appropriate mitigating actions and monitoring their implementation.

The Board will be also in charge of the ethical oversight of the Project's research activities, outputs and experiments and of certifying Circular TwAIn solutions with respect to legal compliance, ethical soundness and human enhancement, besides privacy friendliness. It will monitor the activities and outputs of the Project, including the deliverables and provide any comments, besides contributing to the ethics reporting at M18 and at M36, which will be prepared in conjunction with the Ethics Mentor. Furthermore, the EAB will provide independent opinions and thoughts, will advise the partners on ethical issues and will discuss any ethical issues arising and agree on an appropriate action plan related to the ethical issues' management in the pilots, providing general guidelines to be refined in each context. The Board is also responsible for establishing all the ethical and legal procedures, together with the EM, and supporting their implementation. EAB's insights, together with the lessons learnt in the use cases, will be at the basis of the elaboration, at the end of the

Project, of the Circular TwAIn workbook, comprising guidelines for the ethically-aligned uptake and use of its technology.

Ethics Mentor

The Ethics Mentor is responsible for internally organising and guiding ethics management and assessment activities, as well as interfacing with the EAB and orchestrating its work. This figure will ensure that the WP leaders include in their workflows the processes needed to make the Project results and activities compliant with the applicable European and national legislations and Horizon Europe ethical guidelines. The EM will guide the Circular TwAIn in the ethical assessment. The EM of the Project is Marina Cugurra (EAI).

Ethics Pilot Managers

Each of the Circular TwAIn pilot leaders appointed an Ethics Pilot Manager, as follows:

Table 2-2: Circular TwAIn Ethics Pilot Managers

	Name	**Contact Details**
Battery Pilot	Luca Gentilini	l.gentilini@cobat.it
Weee Pilot	Evaristo García (TBC)	egarcia@recyclia.es
Petrol-chemical Pilot	Tuğçe Zengil Oturakkaya	tugce.oturakkaya@socar.com.tr

The Ethics Pilot Manager will contribute to the fine-tuning of the ethics protocols and their implementation in the context of each piloting case, lingering over the specific features of each of them in terms of use cases, data collection and processing and local context but will not necessarily be part of the EAB. They will also play a key role in timely identifying any ethics issues that might occur during pilot operations in order to immediately tackle them and take the appropriate countermeasures and mitigating actions.

2.4 Ethical procedures

2.4.1 Procedures for the involvement of the volunteers in Circular TwAIn piloting activities

Piloting activities in most of Circular TwAIn pilots involve human participation, such as manufacturing workers operating digital systems based on AI technology, digital twins and other technologies that will be developed in the Project. Therefore, the following procedures were defined to be applied to any piloting and validation activities where volunteers will be involved. In this document, such procedures are described in general terms and at Project level: they are going to be refined and integrated according to the specific context of each pilot, its validation plan, as well as to the regulatory framework existing in the country concerned. If necessary, according to the national legislation of the country of the pilot at stake, opinions/approvals by ethics committees and/or competent authorities for the research with humans at the pilot site will be submitted and, once obtained, will be kept on file.

The procedures for the involvement of the volunteers in Circular TwAIn manufacturing piloting activities include:

- Recruitment procedures

- Consent procedures

I. **Recruitment procedures**

As regards the procedures and criteria that will be used to identify and recruit research participants, including inclusion and exclusion criteria, the following protocols have been set and will be fine-tuned in each pilots' contexts:

- Information will be given to the potential participants about the manufacturing experiment or pilot, in order to make them interested and willing to serve as research subjects.

- Neither children nor adults not able to give informed consent (or not willing to give it) will take part in Circular TwAIn.

- Participation in the Project does not involve any physical interventions, or invasive techniques, nor will any samples be taken from humans.

- The participation must be voluntary. Any kind of inducement, coercion or perceived pressure will be avoided. Likewise, any situations where participants feel pressurized to take part in a validation activity will be avoided. Adequate time to ask questions and to freely consider whether or not to take part in the research will be provided to the potential participants, in order to ensure that their participation is effectively on a voluntary basis. The volunteers will be able to withdraw from the participation at any point without negative consequences and it will be reminded that participation is voluntary.

- The recruitment will be done following these steps:

    - Project members in charge of the pilots (e.g., researchers, engineers) will contact potential participants in order to recruit and inform them of the research;

    - appropriate information will be given in the volunteers' native language about the manufacturing experiment beforehand as much as possible (so the subject can make a well thought decision). Circular TwAIn researchers' contact details will be provided, in order to allow the volunteers to contact them for further information and decide whether they wish to join in.

- Participants will be asked to sign the informed consent form and the partner, hosting the pilot concerned, will be also responsible for storing the signed forms for future reference.

- Identification of the research participants (manufacturing workers and/or third-party participants). The partners will use their contacts and networks to identify volunteers able to give informed consent. The subjects will be over 18 years old, no distinctions between male and female will be done.

- Recruitment. In some pilots direct tools and methods to approach audiences will be preferred, and in particular face-to-face meetings or other personal contacts.

- Inclusion – exclusion criteria: exclusion of certain participants will only be considered in exceptional cases, and in particular in case there is either an unwillingness to participate or a display of incorrect attitude and behaviour, the subject is under 18

years old or not able to give the informed consent. It is understood that these may evolve during the Project. For recruiting participants, the criteria of interest in the subject will be applied. We aim to be socially inclusive and participants should be approachable, willing, knowledgeable, flexible. Volunteers will be subjects over 18 years of age and able to give informed consent. The Consortium ensure that these individuals will not be stigmatized or otherwise harmed through their participation in Circular TwAIn research.

- Before starting the piloting activities, the Information Sheet and the Informed Consent Form will be given to the participants and they will sign the Informed Consent Form, which will be countersigned by a member of the Project team. When signatures are confirmed, the data captures can proceed.

- An incentive mechanism might be applied, though direct payments are not foreseen.

- Any ethical implications of the volunteers' participation, such as dignity, health, non-discrimination, non-malevolence and well-being, will be prioritized and assessed by the EAB.

- Amicable redress mechanisms will be defined and offered, prior EAB's approval.

II.   Informed consent procedures

These procedures are a relevant aspect to participate in a research project. Circular TwAIn partners are experienced in activities that involve human participation and request declared consent from participants, besides having well established and consolidated procedures in place, to be adapted to local conditions. The informed consent procedures will ensure evidence of the voluntary, free, and informed consent of the participants. Furthermore, considering that the informed consent does not in itself guarantee ethical research, the Consortium will safeguard participants' rights and well-being in the research setting.

The adults legally able to respond will be provided with the consent form and, before requesting them the consent, they will be properly informed in an appropriate form and language.

Circular TwAIn research team will ensure that the potential participants have received understandable and clear information in order to facilitate them being able to make a fully informed decision about whether or not to participate. The language will be comprehensible and suitable for each group. Sufficient time will be given to make a proper decision on the requested consent and the potential participants will be informed that they are free to withdraw at any time, that their personal data will remain confidential and anonymous, and that collected data will be analyzed above all for the entire group of participants, rather than individually. The protocols for participation and withdrawal from participation will be explained. The translation of materials into the local language, when necessary or opportune, will be ensured. The informed consent protocol will adhere to Horizon Europe ethical standards, as well as the GDPR standards, and will include:

- Clear indications to the participants of the aims, overall purpose, methods and implications of Circular TwAIn;

- explanations will be given on: I) the voluntary nature of involvement and the right to withdraw their consent at any time without any consequences; ii) possible risks,

burden or discomfort involved in participation, also giving an estimation about the time and effort expected from them; iii) who is funding the research and for what purpose; iv) who will have access to any data provided/collected by them; iv) a firm commitment to protect their anonymity and privacy; v) reassurance that secure procedures are in place for data analysis; vi) adequate consideration of any unintended/unexpected/incidental findings, including a clear view of how the Consortium intend to deal with them;

- volunteers will have the chance to ask for and receive additional information about research;

- the participants will be informed about the name and contact details of the persons in charge of answering any queries participants may have and of the DPO;

- the possible future uses for which data may be used in the future (in case this is envisaged) will be clarified. In such a case, participants will be asked for consent;

- supplemental informed consent (as circumstances indicate) will be obtained in case research is conducted over an extended period of time than expected, or when there is a relevant change in the nature or focus of the research activities in the pilot's site;

- debriefing will be ensured, with adequate information regarding the nature and aims of the research, other than that provided when obtaining informed consent. Reasonable steps will be taken to correct any misconceptions they may have that the researcher is aware of.

2.4.2   Ordinary and extraordinary procedures

The following ordinary procedures will be followed, based on good practices from previous European Projects:

- It will be ensured continuous interaction and exchange between ethics experts and the technical team. A constructive relationship will be established between the ethical figures and the technical team, in particular the Coordinator and the WP Leaders. This will ensure an inter-disciplinary perspective and a fruitful dialogue, useful to raise awareness of WP Leaders on the key ethical aspects. They will therefore ensure that the activities in their respective WP include adequate workflows inspired by the Responsible Research and Innovation principles in line with the highest ethical standards and the existing regulatory landscape. In this way, Circular TwAIn artefacts will fully respect individuals' fundamental rights, privacy and personal data protection, without any infringement of legislation. Despite the pilot leaders having experience in conducting experiments/trials with human participants, a dedicated workshop for their staff will be arranged on privacy and ethical issues and on the safeguards to be taken.

- The ethical dimension of the Project and of the individual-work packages will be discussed in the General Assembly, outlining how they have been addressed and devoting time for the possible identification of emerging research ethics issues that may not have been foreseen at the outset of the research.

- The EAB, as stated in the Consortium Agreement under Section 6.5, will be in charge of the ethical oversight of the Circular TwAIn research activities, outputs and

experiments and of certifying Circular TwAIn solutions with respect to legal compliance, ethical-soundness and human enhancement, besides privacy friendliness.

- All the partners are expected to conduct their research following the principles of the European Code of Conduct for Research Integrity and own institutional, professional, and national code/framework for research ethics. They might also be monitored by specific institutional ethics oversight structures (such as university-based ethics committees).

- Circular TwAIn research staff will be also encouraged to pursue further training in research ethics.

- Despite the Project activities are not expected to expose researchers and research participants to any particular risk, however, the WP Leaders and the overall Consortium will continuously monitor potential emerging risks and, in case of occurrence, any kind of risks to research participants must be minimized.

- To ensure that the ethical requirements of each pilot sites' countries are met, the respective pilot's leaders will be responsible for obtaining the appropriate institutional ethics approval, including, if relevant, for any collection of personal data.

As regards the extraordinary procedures, applicable in case of ethical issues, the following applies. The Project's partners will consult:

1. at first, their own ethics departments,

2. in a second time, the Ethics Advisory Board of the Project.

They will adhere to the recommendations of ethics departments and/or of the Ethics Mentor and/or of the EAB and will implement the proper mitigating actions and safeguards necessary in order to fully comply with the regulatory obligations or constraints and ethical standards/best practices.

2.5 Gender-sensitive approach, inclusiveness & research Integrity

Circular TwAIn Consortium is fully committed to effectively addressing the **gender dimension** and to be compliant with the EU Gender Equality Strategy 2020-2025[1] [9], in line with the consolidated gender equality and gender balancing policies and practices followed by Circular TwAIn partners in their daily activities and other European and national projects. The Consortium confirms its commitment to promoting equal opportunities, as well as balanced participation of genders at all levels in research and innovation teams and the management structures, as well as in the management decisions and processes, ensuring that all genders are equally involved (for instance, Work Package and Task leadership, and participation in decision-making meetings). The gender dimension will be also integrated within the content of research and innovation, since the gender aspects will be taken into account also during the research and demonstration activities in view of ensuring the societal

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[1] COM(2020) 152, final. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. A Union of Equality: Gender Equality Strategy 2020-2025

relevance and scientific quality of the Circular TwAIn solutions: the analysis of all gender and sex-related needs and expectations will be taken into account, as well as the behaviors and attitudes and social/cultural features of all genders, both during the development phase and within the validation activities and trials. During the investigation of scenarios and user needs and in the evaluation phase, the Consortium will pay attention also to gender-related issues. The Gender Equality Plan (GEP) has been created and is into force for the partners concerned and it is aligned to the requirements of the eligibility criteria in the Horizon Europe.

As regards **inclusiveness**, one of the objectives of the Project is the development of trustworthy AI and collaborative systems (T7.3 "Trustworthy AI and Collaborative Intelligence"), meeting all the relevant requirements, including also non-discrimination and fairness. In this direction, Circular TwAIn technological assets and artefacts will be designed and developed having in mind the respect of human rights and democratic values by a better use of the huge potential of qualities of human beings. Following a human-centric approach, such artefacts should be capable of assisting ageing, disabled and apprentice operators and useful for increasing working capabilities in a fully inclusive manner, with effective compensation for age-, disability-, and inexperience-related limitations of the worker/operator, as well as with methods and tools for a continuous adaptation of workplaces to the physical, sensorial and cognitive capabilities of each operator. The Collaborative Intelligence paradigm is expected to go beyond: in the CI-driven environment, based on the synergy between human and autonomous machines sharing the same workspace and workpieces in a collaborative manner, besides the respect of human values and ethical principles, the empowerment dimension is added: each operator and each knowledge worker could be empowered by machines, acting as individuals' capability multipliers and thereby offering unprecedented opportunities for better achievements at cognitive, physical and relational level in an inclusive manner. The efforts of the Consortium are therefore going to be directed to put its technological advances at the service of human needs and interests in view of customizing the production process to the needs of the worker and of his/her flourishing.

Furthermore, the Consortium is fully committed to respecting the fundamental principle of **Research Integrity** and adhering to the European Code of Conduct for Research Integrity of ALLEA [10], better known in the research community as the "ALLEA code". Such code is recognized by the European Commission as the reference document for research integrity for all EU-funded research projects and as a model for organizations and researchers across Europe. The ALLEA Code was drafted by All European Academies (ALLEA), the European Federation of Academies of Sciences and Humanities. It was originally published in 2011 and then revised in 2017. It will be followed by Circular TwAIn researchers to realize their professional responsibility concerning the practical, ethical and intellectual challenges inherent to this research towards ensuring their Responsible Conduct of Research (RCR). The following are the four principles outlined by the ALLEA Code to which the Circular TwAIn Consortium will refer and adhere, as well as will align its activities to the more action-oriented norms, based on such principles:

- Reliability in ensuring the quality of research. It will be reflected in the design, the methodology, the analysis and the use of resources within Circular TwAIn;

- Honesty in developing, evaluating, reviewing, validating, reporting and communicating the research and its outcomes. Circular TwAIn Consortium will dedicate attention to proceed in a transparent, fair, full and unbiased way;

- Respect for colleagues, society, ecosystems, research participants, cultural heritage and the environment;

- Accountability for the research and its results from the very beginning of idea generation to its development, implementation, publication, as well as for its management and organization, for training, supervision and mentoring, and for its wider impacts"[2].

The Consortium will also monitor the statements of the World Conference on Research Integrity, organized every two years, on the different topic (such as research collaboration) in order to follow their indications and uniform and shared vision of research integrity. It will be also explored whether some of the additional guidelines, elaborated by different entities (such as disciplinary organizations, journals, faculties) and translating the ALLEA norms to specific contexts and circumstances (coauthorship, for example) are relevant to Circular TwAIn activities and results. This reference might be very useful especially in the borderline situation, considering the lack of a clear-cut definition of research integrity and of a list of "does and don'ts" applicable to all researchers in any circumstances.

Thanks to this comprehensive and holistic approach, taking into account all the dimensions mentioned hereabove, the Consortium will embrace the **Responsible Research and Innovation (RRI) approach**, aligning its scientific practices and results with collective values, focusing on the relationship between research, innovation and society, as well as being capable of effectively addressing the new questions, risks and ethical dilemmas potentially opened up by its research activities. In this way Circular TwAIn partners will move forward in anticipating the possible consequences of the issues raised by the research, thereby reducing the gap between science and society.

2.6 Ethics and Data Protection Impact Assessment Methodology for Circular TwAIn Industrial Pilots

An important element of Circular TwAIn Ethical Policy consists in the definition and implementation of the Ethics and Data Protection Impact Assessment Methodology for the pilot cases. It will be conducted before the involvement of human beings and the collection of their personal data will take place and its findings will be reported in the next release of this deliverable, namely D1.4 "Ethics Analysis, Governance and Guidelines – Second Version" at Month 18. It is functional to the assessment of risks for individuals' rights, freedoms and wellbeing, for ensuring compliance with the data protection law (GDPR and national regimes), and ethical mandates for the research with humans, the protection of personal data and the design and/or use of Artificial Intelligence solutions. This methodology efficaciously supports accountability and allows the pilot partners to demonstrate due diligence in taking adequate actions to ensure full compliance on an ongoing basis in each use case scenarios, when relevant. It will rely on the data lifecycle and use cases in each of the Circular TwAIn Pilots, dwelling upon the ethical procedures and pilot-specific features

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[2] *The European Code of Conduct for Research Integrity of ALLEA, Revised Edition, 2017*

relevant from the legal and ethical perspective. The building blocks of the Ethics and Data Protection Impact Assessment are as follows:

I. Human Involvement

This pillar refers to the participation in the piloting operations of individuals, volunteers and stakeholders external to the research staff. As an example, it might happen for instance as regards the usability tests, validation workshops, experiments with volunteers, focus groups, questionnaires, interviews, standardized tests and direct observation. In other words, it refers to the involvement in the experiment operations of human beings, different from the Circular TwAIn team (with subsequent privacy and ethical implications). In case of research with humans, the pilot leader/ ethics pilot manager has to provide more information about the informed consent and recruitment procedures, such as how these individuals/participants are identified and selected, which are the inclusion and exclusion criteria for this recruitment, which methods are used to recruit them (for instance face-to-face personalized e-mails, telephone, social media, website, etc.).

II. Personal data collection and/or processing

This building block concerns the privacy, regulatory compliance and ethical implications regarding the collection and/or processing of personal data in the pilot concerned. In this regard, several questions are asked, including on specific and "sensitive" tools and techniques like the use of the video-surveillance (CCTV and intelligent visual surveillances), the use of the technologies for access control (authentication, authorization), the use of biometric identification. Furthermore, this section comprises questions on the ethics procedures and organizational aspects, for instance on the appointment of a Data Protection Officer (DPO), on the need to perform a data protection impact assessment under art.35 GDPR, and on the respect of adequate informed consent procedures in regard to data collection and processing, as well as the request of information regarding the processing of sensitive personal data and related justification and details on how the partners are going to adhere to the data minimization principle (anonymization/pseudonymization techniques and other technical/ organizational measures, security safeguards, etc.).

III. Artificial Intelligence

This aspect concerns the check on the applicability of the Ethics guidelines for trustworthy AI developed by the High-Level Expert Group on AI and the classification or not of the AI system to be used in the pilot as a high-risk solution according to the AI Act classification[3].

The Consortium will refer in a flexible and dynamic manner to the "Assessment List for Trustworthy Artificial Intelligence" (ALTAI) for self-assessment. It was prepared by the same the High-Level Expert Group on Artificial Intelligence (AI HLEG) [11] which elaborated the Ethics guidelines with the aim of providing a practical tool to support AI developers,

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[3] AI systems identified as high-risk include AI technology used in: critical infrastructures (e.g. transport), that could put the life and health of citizens at risk; educational or vocational training, that may determine the access to education and professional course of someone's life (e.g. scoring of exams); safety components of products (e.g. AI application in robot-assisted surgery); employment, management of workers and access to self-employment (e.g. CV-sorting software for recruitment procedures); essential private and public services (e.g. credit scoring denying citizens opportunity to obtain a loan); law enforcement that may interfere with people's fundamental rights (e.g. evaluation of the reliability of evidence); migration, asylum and border control management (e.g. verification of authenticity of travel documents); administration of justice and democratic processes (e.g. applying the law to a concrete set of facts)

deployers and users in the development and use of Trustworthy AI, supporting the actionability of the seven key requirements of the Ethics Guidelines for Trustworthy Artificial [12]. However, it is important to mention that additional aspects relevant from the ethical viewpoint in relation to the use of AI will be investigated in the Human Right Impact Assessment in T7.3.

The following table will be used to conduct the outline of the Ethics and Data Protection Impact Assessment for each of the Circular TwAIn Pilots, gathering the pilot-specific features from the legal and ethical point of view:

Table 2-3: Ethics and Data Protection Impact Assessment

#	Name	Criterion info	YES/NO	Notes
1	EXTERNAL HUMANS	Involvement and participation of individuals, volunteers and stakeholders external to the research staff		
		Only If external humans involved		Description
		External humans' identification and selection		
		Inclusion and exclusion criteria for recruitment of external humans		
		Methods used to recruit external humans		
		Clarify whether vulnerable individuals/groups will be involved		
		Informed Consent Procedures (Informed Consent Form and Information Sheet)		
		Is necessary to obtain an opinions/approval by ethics committees and/or competent authorities for your planned activities with humans?		

#	Name	Criterion info	YES/NO	Description
2	PERSONAL DATA COLLECTION AND/OR PROCESSING	Confirmation of compliance with GDPR and respective national legal framework(s)		
		Confirm of appointment of a Data Protection Officer (DPO) and that the contact details of the DPO will be made available to all data subjects involved in the research		
		Processing of sensitive personal data and related justification		
		Anonymization/pseudonymization techniques and other technical/ organizational measures that will be implemented to safeguard the rights		

		and freedoms of the data subjects/research participants		
		Security measures that will be implemented to prevent unauthorized access to personal data or the equipment used for processing must be provided		
		Informed consent procedures (consent form and information sheet) in regard to data processing		
		Confirmation of compliance with GDPR and/or with the laws of the country in which the data was collected in case of international transfer of personal data (from the EU to a non-EU country and/or from a non-EU country to the EU)		
		Need to conduct a data protection impact assessment under art.35 General Data Protection Regulation 2016/679		
		In case of profiling, confirmation that adequate information will be provided to the data subjects and that adequate safeguards for his/her rights will be taken		
		In case of further processing of previously collected personal data, confirmation of the lawful basis of it		
		Use of the video-surveillance (CCTV and intelligent visual surveillance)		
		Use of access control techniques		
		Use of biometric identification tools		
	ARTIFICIAL INTELLIGENCE	Check the applicability of the Ethics guidelines for trustworthy AI developed by the High-		
		Level Expert Group on AI and of the related Assessment List for Trustworthy AI (ALTAI)		
		High-level risk application according to the proposal for a Regulation on Artificial Intelligence (AI Act). In case of high-risk application, indicate the measures that will be taken to comply		

		with the AI Act requirements and mandate[4].		

3 Holistic approach towards trustworthiness and ethically-soundness in Circular TwAIn

Considering the transversal nature of the legal and ethics-related activities, this section provides a description of the interplay and synergies among the work to be performed under the different tasks of the Project in this regard, with special attention to T1.4 "Ethics Assessment and Governance", T2.4 Socio-technological-business-ethical continuous assessment and 6Ps Transformation", T6.5 Industrial Pilots Socio-Business-Ethics Assessment / Validation and T7.3 Legal & Ethical issues, Standardisation and Regulatory Sandboxes. In addition, it contains insights on how we plan to be aligned with key projects and initiatives relevant to ethical and trustworthy AI and the ALTAI requirements.

3.1 Transversal nature of legal & ethics-related aspects throughout the Circular TwAIn Workplan

The legal and ethical activities and issues have a transversal nature across the Circular TwAIn workplan. Therefore, the content of this deliverable and the work performed within T1.4 is strictly interrelated with:

- **WP2 "User Scenarios, Requirements and socio-economic Assessment"** and **WP6 "Industrial Pilots & Circular Manufacturing Experimentations"**, since the ethical procedures and, more in general, the Circular TwAIn Ethical Policy defined in this document has to be fine-tuned and implemented in each of the industrial pilots' context. Each of the pilots has to identify the relevant regulatory sources at national level or at sector-specific level, to which its operations have to conform and, on the basis of this survey and analysis, elicit the legal and ethical requirements setting the legal boundaries for such operations, including those entailing the participation of human beings as volunteers and the collection and/or processing of personal data. The Trial Handbook is very useful in this regard, in particular for gathering information by the pilot partners on these aspects: in fact, it contains three paragraphs respectively focusing on:

- The Legal and Ethical Framework (§ 1.9.3), reporting the legal and ethical sources applicable in relation to the technology involved in the pilot itself;

- Legal and Ethical Requirements (§ 2.2.3), setting the conditions and legal boundaries related to the pilot's operations and technologies to be employed, including the indication of their nature (ethical or legal) and priority level (critical, preferred or optional);

- Ethical Procedures and experiment specific features (§ 2.2.4), which is the Ethics and Data Protection Impact Assessment of the pilot, with a focus on EU values and human rights.

- **T3.2 "Trustworthy AI and Collaborative Intelligence"**, dwelling upon the methods and solutions to support the development of trustworthy and explainable AI and collaborative Systems. Its findings are aimed at fostering the transparency, trustworthiness and explainability of the AI tools and collaborative systems' operations in Circular TwAIn pilots. In this direction, it focuses on several aspects, including human agency and oversight, technical robustness and safety, privacy and

data governance, transparency, diversity, non-discrimination and fairness, societal and environmental well-being and accountability. Attention will be also dedicated to identify possible high-risk systems according to the AI Act and to plan and implement the adequate mitigations and measures to be compliant with the AI Act requirements and mandate.

- **T7.3 "Legal & Ethical issues, Standardization and Regulatory Sandboxes"**, addressing the legal, regulatory, ethical and standardization issues and challenges for the trustworthy AI and human-centric sustainable manufacturing design, development and adoption functional to give rise to the CI-inspired mutualistic human-AI symbiosis relying on the Ethical guidelines for trustworthy AI. This is expected to maximize the full potential of human-machine collaboration within the circular economy-based manufacturing value-chain, leveraging on trust building and societal acceptance by all stakeholders involved. The Circular TwAIn breakthroughs in this way will be fully privacy-preserving, legal compliant and will uphold EU ethical values. The following activities will be performed:

  o legal and ethical survey on the relevant European and national legislation and relevant ethics sources;

  o two-cycle consultation with stakeholders (regional authorities, civil society organizations, representatives from the workers, etc.) for capturing their viewpoints relying on multi-actor dialogues;

  o legal and ethical requirements for Circular TwAIn technology and piloting operations;

  o ALTAI -driven human rights impact assessment (HRIA) functional to identify and mitigate any possible negative expected impact of Circular TwAIn tools on fundamental rights ensuring citizen-respectful results;

  o Circular TwAIn workbook including takeaways and guidelines for ethically-aligned uptake and use of Project's assets, based on the lessons learnt in the use cases;

  o The active participation to key standardization initiatives, like ISO SC41 IoT&Digital Twin and ISO SC42, with aimed impact on operational SMART standards (Standards that are Machine Applicable, Readable, and Transferable).

3.2 Adherence to the Ethics Guidelines for Trustworthy AI & alignment with key projects and initiatives relevant for ethical and trustworthy AI

Especially the following initiatives and related findings will be taken into account in relation to the future Project's activities:

- **Ethics Guidelines for Trustworthy AI** [13], prepared by the High-Level Expert Group on Artificial Intelligence (HLEG), made of 52 experts. It consists in ethics guidelines on AI directed to foster a trustworthy approach, functional to enable responsible and sustainable AI innovation in Europe. It was published in 2019, taking also into account over 500 recommendations received on the 'Draft Ethics Guidelines' of 2018. Despite this source is neither legally binding nor offers advice on legal compliance for AI, it describes ethical principles relevant to build a

trustworthy AI, which must display the following three characteristics: Lawfulness, Robustness and Ethically-soundness. The Guidelines include examples of opportunities and critical concerns raised by AI. Furthermore, they identify ethical principles governing AI on the basis of fundamental human rights and translate them into seven requirements that AI technologies should fulfill in order to be considered trustworthy:

- Human agency and oversight

- Technical robustness and safety

- Privacy and data governance

- Transparency

- Diversity, non-discrimination, and fairness

- Societal and environmental wellbeing

- Accountability.

As already mentioned, the Consortium is going to conduct the assessment on the applicability and relevance of the "Ethics Guidelines for Trustworthy AI" to its piloting solutions by using the "Assessment List for Trustworthy Artificial Intelligence" (ALTAI) for self-assessment [14], elaborated by the same the High-Level Expert Group on Artificial Intelligence (HLEG) and presented in its final release on the 17 of July 2020.

- **AI4EU OSAI** on the Ethical, Legal, Socio- Economic and Cultural (ELSEC) issues related to AI technologies across Europe. It is directed to offer a selected set of tools supporting people and businesses to better understand the impact of AI technologies across the European Union, focusing on the discussion of knowledge about the ELSEC dimension of AI (ELSEC AI) within Europe.

- **IEEE Global A/IS Ethics**, an initiative aimed at moving "From Principles to Practice" with standards projects, certification programs and global consensus building to inspire the Ethically Aligned Design of autonomous and intelligent technologies.

- **Spanish Regulatory Sandbox on AI**, which has the twofold objective of i) providing practical experience by the application of the various features of the AI Act proposal to well-defined AI projects (e.g. requirements, conformity assessments and certain post-market activities) and ii) of producing guidelines, toolkits and good-practice materials accessible to all to help the development of harmonised European standards and the other preparatory work at national and EU level.

- **STAR** Project (https://star-ai.eu/) in particular in relation to the robustness dimension of trusted AI (including data reliability and AI cybersecurity), as well as in relation to ways for architecting trusted AI systems that adhere to the mandates of the AI Act based on the STAR reference architecture for trusted AI systems.

- **XMANAI** Project (https://ai4manufacturing.eu/) and its highlights in terms of moving from a "black box" to "glass box" paradigm for placing the power and value of the Explainable AI at the service of the manufacturing domain. XMANAI is also part of the ICT-38 AI4MAN ecosystem.

- **AI REGIO** Project (https://www.airegio-project.eu/), validating new models for human-AI interaction of next generation industrial workplaces and addressing related

legal and ethical challenges also thanks to the TERESA in AI TEF (Testing and Experimentation Facility) with protected experimental facilities (AI REGIO Didactic Factories network).

- **SIENNA** Project (https://www.sienna-project.eu/), which addressed the ethical and human-rights respectful approaches for human enhancement technologies, AI and robotics, including potential changes needed in existing regulatory frameworks at the international, EU and national levels.

- **SHERPA** Project (https://www.project-sherpa.eu/), which investigated the ways in which systems combining AI and big data analytics impact ethics and human rights issues, deepening key challenges.

- **European EU Alliance**, conceived by the EC as an initiative for establishing an open policy dialogue on Artificial Intelligence (AI). It was launched in 2018 and, since then, represented a fruitful forum supporting exchanges of views for shaping the European ecosystem of excellence and trust in AI and Robotics. It will be analysed, in particular, its work in relation to the harmonised standards as a key tool for the implementation of the future AI legislation in response to in response to the Commission's standardization request to provide the technical detail necessary to achieve the 'essential requirements' of a harmonisation legislation.

4 Conclusion and future outlook

This deliverable outlines the Circular TwAIn Ethical Policy, which will be the key reference document for ethics-related activities within the workplan and will drive the overall ethical work during the course of the Project.

As described in Section 3.1, the legal and ethical activities have a transversal nature and, therefore, such Ethical Policy will be mainly implemented within WP2 "User Scenarios, Requirements and socio-economic Assessment" and WP6 "Industrial Pilots & Circular Manufacturing Experimentations". In this work-packages the ethical procedures, the ethics forms and the overall Circular TwAIn Ethical Policy will be fine-tuned (for instance in the respective pilot's trial handbook and by completing the information sheet and consent form with pilot/use case-specific data) and implemented, under the guidance of the Ethics Pilot Manager in each of the pilots, supported by the Circular TwAIn Ethics Mentor and under the supervision of the Project's Ethic Advisory Board. Furthermore, thanks to the Ethics Impact Assessment Methodology highlighted in Section 2.6, the risks potentially raised by pilot operations for individuals' rights, freedoms and wellbeing will be assessed and the adequate mitigating measures and safeguards will be identified and taken, in order to ensure compliance with the data protection law and other relevant European and national regulatory sources, as well as with the Horizon Europe ethical mandates for the research with humans, the protection of personal data and the design and/or use of Artificial Intelligence solutions.

The next version of this deliverable at M18 (D1.4) will include the Pilots' Ethics and Data Protection Impact Assessments.

The considerations and findings of this deliverable, such as those concerning the prioritization of human wellbeing, will also guide the technical team in the design, development and/or adaptation and extension of technological components and tools, including the overall Project reference framework and platform architecture, which need to adhere the chosen ethics-and-privacy-by design-and-by defaults approach.

Likewise, the activities in T7.3 "Legal & Ethical issues, Standardisation and Regulatory Sandboxes", which continue to make reference to the Ethical Policy and its ethical approach as the key source for maximizing the full potential of human-machine collaboration within the circular economy-based manufacturing value-chain. In this direction, it will be very important also the ALTAI-driven human rights impact assessment (HRIA) functional to identify and mitigate any possible negative expected impact of Circular TwAIn tools on fundamental rights ensuring citizen-respectful results.

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Annex I – Circular TwAIn Information Sheet

Circular TwAIn Information Sheet

Circular TwAIn stands for "AI Platform for Integrated Sustainable and Circular Manufacturing" (Project's ID: 101058585). It is an **EU research Project**, in particular an Innovation Action, funded by European Commission under HORIZON-CL4-2021-TWIN-TRANSITION-01 Call, in particular topic HORIZON-CL4-2021-TWIN-TRANSITION-01-07.

This Project will research, develop, validate and exploit a novel AI platform for circular manufacturing value chains, which will support the development of interoperable circular twins for end-to-end sustainability. Circular TwAIn will unlock the innovation potential of a collaborative AI-based intelligence in production based on the use of cognitive digital twins. Lingering over the use of trustworthy AI techniques, Circular TwAIn will enable human centric sustainable manufacturing, fostering the transition towards Industry 5.0. The Project will also enable the integration and combination of different data from various sources over entire product life cycle considering sustainability aspects. Innovative services will be delivered among the members of the data ecosystem and embedded in AI-based Digital Twins, supporting an unambiguous communication when realizing complex services for sustainable manufacturing. Circular TwAIn will leverage information from a circular manufacturing dataspace that will provide access to the datasets needed for multi-stage and multi-objective optimizations.

Circular TwAIn technology will be tested and validated in three Industrial Pilots with several use cases involving high-impact scenarios. These Industrial Pilots will respectively pertain to the WEEE domain, to the Battery domain and to the Petrochemical domain.

You are asked to participate in the Circular TwAIn [insert name and number of the pilot], in particular to the scenario [insert name and details, including on the pilot operations], mainly designed for validating [insert details].

The activities in which you will be involved include data collection, handling and retention.

[please provide details on such activities, including on the types of personal data that will be collected and/or processed in them]

In particular, the Circular TwAIn team will carry out: i) the collection of information related to the volunteers including but not limited to biographical information and contact information, to coordinate and schedule tests; ii) photographs and video recordings or other forms of recording of data that capture audio and images of volunteers, as well as iii) collection and processing of [please provide details, including on the types of personal data that will be collected/processed, such as biometric data, sensor, location and traffic data and other data to document how the equipment and tools are used].

Before and/or after the trial, discussions, workshops and group interviews to gather needs, expectations and concerns, and/or obtain feedback in test or research settings will be conducted, and the participants may be asked to fill out a questionnaire.

Circular TwAIn will use the collected data only for research purposes. The final report of Circular TwAIn may include photographs or video recordings of the voluntary participants. All contracted researchers will use the edited photographs and video recordings only to demonstrate how to use technology, equipment or capability in operational or research settings.

Adequate security and privacy-preserving measures for storage and handling of such data will be adopted, using state-of-the-art technologies for secure storage, delivery and access of personal information, as well as managing the rights of the users. In particular, [please provide details on the specific tools/techniques used in the pilot].

The collected data will be stored in a secure server and only the authorized Circular TwAIn researchers involved in the Project will have access to all the users' identities. Anonymous and identity data will be stored separately. Anonymity will be granted by [insert details, for instance: separating identifiable data from anonymous data]. The voluntary participant data will be collected and processed in accordance with well-defined processes in order to guarantee that the accessed, delivered, stored and transmitted content will be managed by the right persons, with well-defined rights, at the right time. At the end of the Project all personal data will be destroyed automatically, and only anonymous or non-identifiable data will be retained after the completion of the final report.

Data will be collected for the piloting activities to be conducted at the [insert the name of the building/facility/office where experiments/trials will be conducted], in [insert the address where experiments/trials will be conducted] from [insert date] to [insert date].

Annex II – Circular TwAIn Informed Consent

Circular TwAIn Informed Consent Form

Voluntary Participation to Circular TwAIn pilot activities:

You will be asked to participate in Circular TwAIn pilot activities, in particular to the scenario/s [insert name], and to the related preparatory activities and workshops for the validation and evaluation of the Circular TwAIn technology.

The scenario consists of [insert details in the scenario and the tools/software/components which will be tested]. In practice, this involves [insert details on his/her participation and on the personal data that will be collected and handled].

Purpose of data collection

The personal data will be collected for the innovation action Circular TwAIn "AI Platform for Integrated Sustainable and Circular Manufacturing" (Project's ID: 101058585), funded by European Commission under HORIZON-CL4-2021-TWIN-TRANSITION-01 Call. Circular TwAIn will use this data for research purposes, notably for [insert details].

You can find additional information in the Information Sheet.

Data to be collected

[insert details on the data to be collected in your scenario]

In addition, images and videos from your participation in the simulated scenarios and workshops will be collected.

You can find additional information in the Information Sheet.

Data storage, sharing, anonymisation and data retention

Your data will be used for [insert details]. Sharing and use of your data will take place following your preferences. In case of choice of anonymization, the following method and tool will be used [insert details on the anonymisation tools and techniques].

Circular TwAIn researchers will destroy all data containing private data as soon as the study/research task will be completed. In any case all personal data will be destroyed automatically at the end of the Project and only anonymous or non-identifiable data will be retained after the completion of the final report.

You can find additional information in the Information Sheet.

Circular TwAIn Consortium Contact Point(s):

1) [Insert Name of the Pilot Leader] [insert also the name of the organisation hosting the pilot]: [insert phone number and email]
2) [Insert Name of the Ethics Pilot Manager] [insert also the name of the organisation hosting the pilot]: [insert phone number and email]
3) Marina Cugurra (Circular TwAIn Ethics Mentor): marina.cugurra@eta-one.com
Data Controller:

[insert the name of the organisation hosting the pilot]

Who has access to this information

By signing the form you give your consent to voluntary participate to Circular TwAIn pilot activities and to the collection, treatment and retention of your p e r s o n a l

d a t a , i n c l u d i n g visual and audio data and sensitive information. The Circular TwAIn Consortium members involved in the pilot activities in which you'll participate will be the only members of the Project that will have access to your personal information. The Circular TwAIn Consortium members who see/access this information will keep it confidential. T h e o t h e r Circular TwAIn researchers will have access to anonymous data only.

Withdrawal Information

Your participation in the Circular TwAIn Project is completely voluntary. You can obtain information and ask for rectifying it. You can choose to stop participating at any time. If you decide to exercise your rights, including the withdrawal from the Project's pilot activities, please contact the Circular TwAIn Consortium contact points outlined above, and they will explain the best way for you to exercise your rights or stop taking part.

You should know that you may be withdrawn from the Project for any of the following reasons:

- If you don't follow the Circular TwAIn Consortium members' instructions.
- If you don't attend the scheduled data collection sessions.
- If the whole Project is stopped, for reasons not known now.

Voluntary Participant Data

Name	
Address	
Email	
Telephone	
Fax	
Applicable Laws/Directives	All relevant national and European pieces of legislation will be applied, including the General Data Protection Regulation (GDPR, Regulation EU 2016/679), and their amendments
Date	[dd/mm/yy]
Declaration	I confirm that I have read the terms outlined and understand them. I freely consent to take part in this study and consent that the data from the Circular TwAIn activities can be stored and used for research purposes as described above and explained to me. Signature