

INTELCOMP PROJECT
A COMPETITIVE INTELLIGENCE CLOUD/HPC PLATFORM FOR AI-BASED STI
POLICY MAKING
(GRANT AGREEMENT NUMBER 101004870)

D8.4. Legal and Ethics Management Report

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ACRONYMS

AI - Artificial Intelligence

D - Deliverable

DMP – Data Management Plan

DoA - Description of the Action

DPO - Data Protection Officer

EC – European Commission

EIGE - European Institute of Gender Equality

ELSI - Ethical, Legal and Social Impact

EP - European Parliament

EU - European Union

GDPR - General Data Protection Regulation

GEF - Global Environment Facility

H2020 - Horizon 2020. The EU's research and innovation funding programme from 2014-2020

LL - Living Lab

MIK - Miller International Knowledge

OSCE - Organisation for Security and Cooperation in Europe

STI - Science, Technology and Innovation

TA - Technology Assessment

TB - Terabyte

UN - United Nations

WP - Work Package

INTRODUCTION

The IntelComp project sets out to build an innovative cloud platform that offers artificial intelligence-based services to public administrators and policy makers across Europe for data-driven policy making in the field of Science, Technology, and Innovation (STI) policy.

One of the objectives of Work Package (WP) 8, Project Management and Coordination, is to analyze and oversee the legal and ethical issues that arise within the project activities. Task 8.4, Ethical, Legal and Social Impact (ELSI) Analysis, established that an Ethics Manager would be appointed to oversee all ethical and legal issues which may arise from the various activities. Until February 2023, Cecilia Cabello was Ethics Manager of IntelComp. Due to a professional change, Ms Cabello stepped down as Ethics Manager in February 2023 and Borja Izquierdo was appointed as new Ethics Manager.

Furthermore, according to Task 8.4, the ELSI analysis would be subcontracted to an external partner under the supervision of the Ethics Manager. The task would consider how the legal aspects of the data affect the interaction of IntelComp with content providers (commercial or public) and users. The task adhered to the compliances of Section 5.1 (Ethics) of the Grant Agreement – Annex 1. Description of the Action (DoA)– Part B with the involvement of participants, especially citizens in the Living Labs (WP6) and it also supported aspects addressed in WP9, Ethics Requirements.

To subcontract the service to a contractor with well-known experience and knowledge, FECYT, with the assistance of the IntelComp consortium, contacted three potential contractors with the capacity to perform the service. The ELSI Report was commissioned to Miller International Knowledge (MIK¹). MIK is a multidisciplinary law firm based in Spain. It is a spin-off of the H2020 Path2Integrity project. The firm is specialized in Open Science, data protection and management, legal and ethical issues around AI and FAIR principles. MIK is also a member of the EOSC Association².

The MIK partner involved in the report is Katharina Miller, who has been working (with significant roles as WP and task leader: Advisory Board, Ethics Committee and Ethics Advisor positions) in the following Horizon 2020 (H2020) and Horizon Europe projects: H2020 Path2Integrity, H2020 DivAirCity, H2020 ALLINTERACT, H2020 IMPACT EdTech and now in Horizon Europe i-RISE and RE-WIRING. Katharina Miller is also an external ethics advisor to the European Commission and a project evaluator for Horizon Europe. In addition, she is also a member of the European Science Foundation Review College, where she reviews multidisciplinary research projects around AI and new technologies.

The contractor provided a first version of the ELSI Report in June 2023 and an updated report in December 2023.

This deliverable explains how ethical and legal issues have been managed along the project. The first part of this deliverable includes the first version of the ELSI Report (authored by the

¹ <https://miller.international/>

² <https://www.eosc.eu/members/miller-international-knowledge-mik>

contractor), which was reviewed by two members of the project Ethics Advisory Board: Txetxu Ausín and Karma Peiró; and by internal reviewers. The comments by the reviewers were included as annexes.

The second part of this deliverable includes the updated version of the ELSI Report (authored by the contractor), which has been reviewed by internal reviewers. The comments by the reviewers have been included as an annex.

PART I. ELSI REPORT (JUNE 2023)

EXECUTIVE SUMMARY

According to the IntelComp DoA, “(a)n Ethical Legal and Social Impact analysis will be performed. This task will consider how the legal aspects of data affect the interaction of IntelComp with content providers (commercial or public) and users.”

ELSI, short for Ethical, Legal, and Social Implications, refers to the examination and consideration of the potential ethical, legal, and social impacts that arise from scientific research and technological advancements. The term is often used in the context of emerging fields such as genetics, biotechnology, artificial intelligence, and nanotechnology, where the potential consequences can have far-reaching implications.

ELSI reports are typically produced by experts in the respective fields to analyze the ethical, legal, and social implications of specific scientific advancements or technological applications. These reports aim to raise awareness, stimulate discussion, and inform on the policy-making processes.

This report finalizes with the following recommendations:

- In the following (and last) events of the three Living Labs (LL) AI, climate change and health/cancer, experts in gender equality and vulnerable population should be invited to the respective LL events. This would bring in a necessary and new perspective to the three topics AI, climate change and health/cancer.
- It is important that Google guaranteed to UC3M that the backup related copies are also located in EU, and furthermore, that there is no access by Google or any third party related to Google and not part of the IntelComp consortium (companies, AI, robots, crawler bots or individuals) to confidential information hosted in that server.
- It is recommended that IntelComp realized an external audit of its AI related tool(s) after 1 year of its working.

1. ELSI REPORTS IN GENERAL

ELSI, short for Ethical, Legal, and Social Implications, refers to the examination and consideration of the potential ethical, legal, and social impacts that arise from scientific research and technological advancements. The term is often used in the context of emerging fields (Kishimoto, 2020) such as genetics (Pullman and Etchegary, 2015), biotechnology (Bulger et al 1995), artificial intelligence (Hartwig, Ikkatai, Takanashi et al, 2021), and nanotechnology (Hussain, 2022), where the potential consequences can have far-reaching implications.

ELSI reports are typically produced by experts in the respective fields to analyze the ethical, legal, and social implications of specific scientific advancements or technological applications. These reports aim to raise awareness, stimulate discussion, and inform on the policy-making processes.

ELSI reports have been issued for several decades, particularly in the fields of genetics and genomics.

The term "ELSI" was first coined in the context of the Human Genome Project, a large-scale international research effort that aimed to sequence the entire human genome (Kishimoto, 2020). Recognizing the need to address the ethical, legal, and social implications of this groundbreaking research, the National Institutes of Health (NIH) in the United States established the ELSI Research Program in 1990 (Drell, 2001).

Since then, ELSI reports have become a common practice in various scientific and technological domains, see, for example, BBMRI-ERIC - ELSI Knowledge Base³ and EU final reports relating to ELSI in Horizon 2020:

- Final Report Summary - SYBHEL (Synthetic Biology for Human Health: Ethical and Legal Issues)⁴
- B1MG Project (this project is funded by European Union's Horizon 2020 Research and Innovation programme under grant agreement No. 951724)⁵
- SIENNA Project - Ethical Guidance for research with a potential for Human Enhancement⁶
- CINECA Project - Catalogue of ELSI Issues⁷

As mentioned above, as new technologies emerge, such as artificial intelligence, nanotechnology, and biotechnology, experts and policymakers have increasingly recognized the importance of assessing and addressing the potential ethical, legal, and social impacts associated with these advancements.

ELSI reports serve as a valuable tool for identifying and understanding the complex issues that arise from scientific and technological developments. They help guide responsible research and

³ <https://www.bbmri-eric.eu/elsi-knowledge-base/>

⁴ <https://cordis.europa.eu/project/id/230401/reporting>

⁵ <https://b1mg-project.eu/work-packages/wp2>

⁶ https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/ethical-guidance-for-research-with-a-potential-for-human-enhancement-sienna_he_en.pdf

⁷ <https://zenodo.org/record/3943732>

development, inform public policy decisions, and foster public dialogue on important matters related to science, technology, and society.

2. INTELCOMP ELSI REPORT

2.1. Methodology

This ELSI analysis is based on the following IntelComp related documents:

- Amendment - AMD-101004870-18
- DoA-Part_B-Workplan_Ethics
- IntelComp_Summary
- IntelComp 1st General Assembly Meeting - Item 6. Status of WP9
- IntelComp 2nd General Assembly Meeting - Update on WP9 (Ethical Issues)
- D1.2 Report on the selected measurement and data collection
- D2.2 Data ingestion and ETL tools
- D2.3 IntelComp STI Data Space
- D2.4. STI Data Space design and schema generation scripts, with associated documentation about the DB structure.
- D2.5 IntelComp STI Data Space
- D6.1. Living Lab Setup and Planning.
- D7.3. Engagement plan.
- D7.4. Training plan.
- D8.3 Progress report
- D8.5. Data Management Plan.
- D9.1. H - Requirement No. 2. Templates of the informed consent
- D9.2. POPD – Requirement No. 4. Data Protection Officer (DPO) Appointment
- D9.3. POPD – Requirement No. 5. Technical and organizational measures to safeguard the rights of research participants
- D9.4. POPD – Requirement No. 6. Anonymization / pseudo anonymization techniques

In general, ELSI research applies both empirical and nonempirical methods (Parker et al, 2019). This ELSI analysis makes use of normative and conceptual methods which are embedded in three different methodologies.

Firstly, the doctrinal legal research methodology. It focuses on the letter of the law rather than the law in action, by composing a descriptive and detailed analysis of legal rules found in primary sources (cases, statutes, or regulations) (Hutchinson and Duncan, 2012). This is especially important for the legal implications of IntelComp such as the GDPR and the legal texts mentioned in Section 5.1 (Ethics) of the DoA – part B.

Secondly, the critical theory, which is a way of doing philosophy that involves a moral critique of culture. “Critical” theory, in this sense, is a theory that attempts to disprove or discredit a widely held or influential idea or way of thinking in society (Internet Encyclopedia of Philosophy). This methodology is important for the ethical aspects within IntelComp.

The third methodology is the Technology Assessment (TA). TA is the study and evaluation of new technologies. It is a way of trying to forecast and prepare for the upcoming technological advancements and their repercussions to the society, and then make decisions based on the judgments. It is based on the conviction that new developments within, and discoveries by, the scientific community are relevant for the world at large rather than just for the scientific experts themselves, and that technological progress can never be free of ethical implications (Rip, 2015). This methodology implies the review of the social implications of IntelComp.

2.2. ELSI Analysis

As already mentioned above, this ELSI analysis applies normative and conceptual methods which follow the structure of the Ethics Appraisal Procedure of the H2020 Online Manual. It is an in-depth analysis of the ethical issues of the IntelComp project, taking into account, when available, the conclusions of the Ethics screening or previous Ethics assessment within IntelComp (see D9.1.-D9.4).

2.2.1. Humans

In the requirement 2 (D9.1) the Consortium of IntelComp explains why Human participation is needed and they revert to the Engagement plan (D7.3).

Neither the target group analysis nor the engagement model mentions the proactive appointment or selection of representatives from vulnerable population or a specific encouragement of women to participate in the different phases of the IntelComp engagement funnel.

There is no legal obligation such as a quota law to actively involve vulnerable persons or women in research projects.

The Charter of Fundamental Rights of the EU prohibits any discrimination based on any ground such as sex, race, colour, ethnic or social origin, genetic features, language, religion or belief, political or any other opinion, membership of a national minority, property, birth, disability, age or sexual orientation (art. 21.1). Furthermore, it states that “(e)quality between women and men must be ensured in all areas, including employment, work and pay” (art. 23) and specifies that “(t)he principle of equality shall not prevent the maintenance or adoption of measures providing for specific advantages in favour of the under-represented sex”.

Additionally, the United Nations General Assembly resolution 2030 Agenda, known colloquially as Agenda 2030, established the central, transformative promise “Leave no one behind (LNOB)” (UN, 2015).

Not specifically involving vulnerable persons or targeting women in a research project does not constitute discrimination.

Nevertheless, IntelComp project is a Horizon 2020 Innovation Action to build a platform that will be able to analyze large volumes of textual data using Artificial Intelligence services. IntelComp adopts a Living Labs methodology and involves external Public Administrations and stakeholders (civil society organizations, academia, and industry organizations) (i) to co-design and co-create Intelcomp tools and services; and (ii) to validate the resulting platform through the co-creation

of Science, Technology, and Innovation policies in three different domains: artificial intelligence, climate change and health/cancer.

Therefore, IntelComp has to make sure that many different perspectives are engaged by striving for inclusivity and making efforts to reach underrepresented populations.

Artificial intelligence Living Lab

For AI this is especially important as one of the ethics issues related to AI is bias (West and Allen, 2020). Not addressing or applying this ethics issue can lead to violation of human rights. There are many initiatives underway with regards to the ethical aspects of AI and one of them is the High-level Expert Group on Artificial Intelligence (AI HLEG) which is mentioned by the IntelComp consortium.

According to the AI HLEG (2019), AI related bias issues exist because “many AI systems, such as those including supervised machine learning components, rely on huge amounts of data to perform well (...)”. The bias gets into the data because humans who create the datasets or set the instructions for the machine learning bring in her or his own bias, and this can happen consciously or unconsciously. Cathy O’Neil (2016) explains this perfectly with the example of a mother who wants to communicate her “internal dynamic cooking model” to a third person by formalizing this model, “making it much more systemic and, in some sense, mathematical”. These kind of models “despite their reputation for impartiality, reflect goals and ideology”, because human beings always feed models with their own values and desires. According to the AI HLEG and many other activists, “unfair bias must be avoided, as it could have multiple negative implications, from the marginalization of vulnerable groups to the exacerbation of prejudice and discrimination.” Especially the bias aspects are very relevant for AI Ethics as the evaluative experience (meaning the values for each human being) is different for every human being; in an automatized world, it’s very difficult to maintain the evaluative experience.

In the following some examples from within a normal hiring funnel (and not related to the IntelComp Engagement funnel) shall illustrate in which ways AI is already interfering with people’s very own evaluative experience.

- This was the case for Amazon’s AI recruiting tool, which showed bias against women (Dastin, 2018). Amazon had tried to develop a tool that selects automatically the top five applicants out of hundreds. The responsible staff at Amazon trained their computer models to check applicants by observing patterns in CVs submitted to Amazon over a 10-year-period. At that time, most CVs had been submitted by men which reflected the lack of visibility of woman across the tech industry at that time (and which still exists). That’s how Amazon’s machine learning taught itself that male candidates were preferable over women. The tool penalized CVs that included the word “women’s,” as in “women’s chess club captain.” Furthermore, Amazon’s AI recruiting tool downgraded graduates of two all-women’s colleges because they did not specify the names of the schools (Dastin, 2018). It is as easy as “garbage in, garbage out” (GIGO), meaning that the specific data you fill into a machine comes out as this specific data.
- Another recruiting tool claims to measure the performance of applicants in video interviews by automatically analysing verbal responses, tone of voice and even facial expressions, such

as the tool "HireVue". This tool allows employers to retrieve recorded interview responses from job applicants and then rate these responses against the interview responses of current, successful employees. More specifically, HireVue's tool analyses videos using machine learning and extracts signals such as facial expressions, eye contact, vocal signs of enthusiasm, word choice, word complexity, topics discussed and word groupings. According to Miranda Bogan and Aaron Rieke (2018) the use of tools such as "HireVue" raises ethical questions. They think speech recognition software may perform poorly, especially for people with regional and non-native accents. Additionally, voice recognition still has significant race and gender biases (Palmiter Bajorek, 2019). Furthermore, facial analysis systems may have difficulty recognising faces of women with darker skin tones. In addition, some respondents might be rewarded for irrelevant or unfair factors, such as exaggerated facial expressions, and penalised for visible disabilities or speech impediments. On the other hand, the use of this type of biometric data might have no legal basis if the data is used to predict success in the workplace, to make or inform hiring decisions.

- There are hiring tools that currently aim to predict whether applicants might violate workplace policies or to assess what mix of salary and other benefits should be offered. The fear is that such tools could widen the pay gap for women and non-white workers (Bogan and Rieke, 2018). This is because data obtained by Human Resources departments tends to contain a lot of information on a future worker's socioeconomic and racial status, which could be reflected in predictions of salary requirements. Furthermore, offering employers highly specific insights into an applicant's salary expectations increases the information asymmetry between employer and applicant at a critical moment in the negotiation.

There are many examples of algorithmic discrimination. For example, a Google search on "professional" hair show mostly pictures of white women while a search for "unprofessional" hair displays predominantly pictures of black women. Similarly, facial recognition applications perform much worse at recognising black women's faces than white men.

In 2019, a first instance decision of the Divisional Court of Cardiff dismissed a claim concerning the lawfulness of the South Wales Police's use of the "AFR Locate" face recognition system. The Court of Appeal overturned that decision, because it found that the facial recognition programme used by the police was unlawful. The Court of Appeal ruled that "too much discretion is currently left to individual police officers". It added that "[i]t is not clear who can be placed on the watch list, nor is it clear that there are any criteria for determining where [the technology] can be deployed". (UK, Court of Appeal, R (Bridges) v. CC South Wales, [2020] EWCA Civ 1058, 11 August 2020; Ars Technica, 'Police use of facial recognition violates human rights, UK court rules', 11 August 2020.) Furthermore, the judges held that the police did not sufficiently investigate if the AI based technology exhibited race or gender bias. In Europe, this was the first ruling specifically on AI and algorithm discrimination. For law enforcement agencies, it significantly narrows the scope of what is permissible and what must be done to fully respect human rights.

Meredith Broussard (2019) has already been warning in 2014 "Why Poor Schools Can't Win at Standardized Tests". She uses as example a Pennsylvania System of School Assessment (PSSA) test from 2009 for students aged 8-9 and the question to write down an even number with three

digits and to explain how they arrived at their answer. The following answer is correct: “932 is an even number because all you have to do is look in the ones place. If you can divide that number equally, it is even. An even number in the ones place makes the whole number”. If a student answered: “200, cause it is an even number and it has digits” the answer would only be partially correct, as “the third-grade student lacked the specific conceptual underpinnings to explain why it is correct” (Broussard, 2019). Unfortunately, not all students have access or can afford to buy the books which provide this very specific knowledge on this very specific answer.

These examples above demonstrate why it is important to have a variety of stakeholders in the IntelComp Engagement funnel, who can bring in their very own perspectives especially to the last engagement phase, the engagement in the LL AI for the last events. This could be especially done by inviting stakeholders from vulnerable populations that are knowledgeable of AI issues (such as the Spanish Foundation Secretariado Gitano) and experts on gender bias and policies.

Climate Change Living Lab

Neither in the D9.1 nor in the D6.1 there is no mention of specifically targeting women or vulnerable persons in relation with the LL climate change and the documents seem to be gender-neutral. In the following it shall be explained why it would have been important to gender mainstream the LL climate change and why it is highly recommended to include experts on gender equality and climate change for the last two LL climate change events in 2023.

The environment is a shared resource and access to it is crucial for the wellbeing of individuals and communities. Research has highlighted the importance of understanding gender roles to ensure environmental security (see for example Geneva Environment Network). Women are disproportionately impacted by climate change and other ecological threats due to their more limited access to resources such as land, technology, education, and decision-making power. To ensure environmental security, it is essential to provide women with equal access to resources and opportunities, so that they can play a more active role in protecting their environment (UN Women). For IntelComp this means considering gender-specific considerations when designing interventions for climate change adaptation and mitigation, as well as promoting the inclusion of women in all aspects of decision-making processes related to the environment. Only by ensuring that women are enabled to meaningfully participate and have access to resources can IntelComp have impact in environmental security in the long run.

According to the Organisation for Security and Cooperation in Europe (OSCE), in recent decades “the importance of the linkages between environmental security and gender roles has been evidenced by a wide corps of research and impact assessments”. Women play decisive roles in managing and preserving biodiversity, water, land, and other natural resources locally. Meanwhile, although environmental degradation has severe consequences for all human beings, it particularly affects the most vulnerable, mainly women and children who constitute the majority of the world’s poor (UN Women B). This is especially dramatic in conflict and post-conflict contexts where women usually face the burden of securing survival for themselves and their families with no or little resources, information, and decision-making power for rescue or rehabilitation (UNFPA, 2001).

The OSCE concludes that:

- Women are still often ignored and absent from major policies and daily project activities regarding their needs and environmental knowledge.
- Since 2009 it has been acknowledged that gender neutral policies of this kind have a stronger impact on women when environmental disasters and insecurity occur. This also leads to the loss of opportunities “for a better management of environmental resources, along with opportunities for greater ecological diversity, productivity of foods and economic stability”.

The United Nations Environment Programme (UNEP) Policy and Strategy for Gender Equality and the Environment 2014-2017 echoes the conclusion of the United Nations Framework Convention on Climate Change (UNFCCC) of 1994: “gender equality in environmental policy means addressing the needs of both women and men and promoting women’s participation in decision-making processes”.

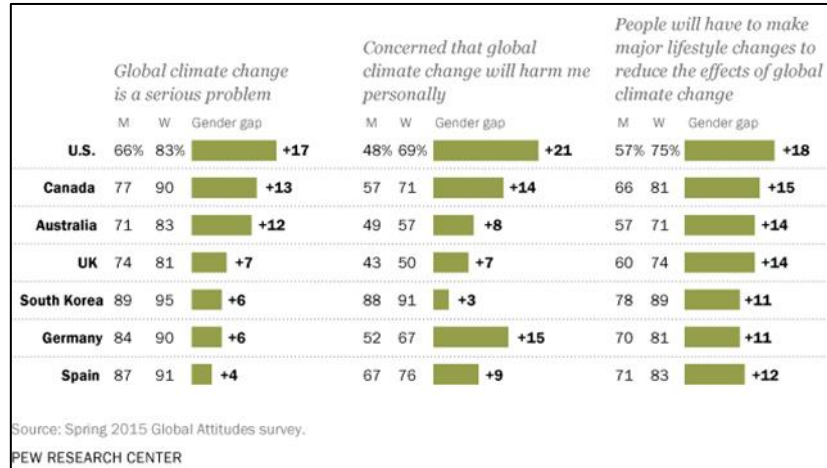
Thus, a gender perspective is relevant in all different areas of environmental policy. As stated in 2009 and reaffirmed in 2017 by the Global Environment Facility (GEF), “(g)ender relations between women and men, and girls and boys, play a key role in the access to and control of environmental resources, as well as the goods and services they provide”. The GEF unites 184 countries in partnership with international institutions, civil society organisations (CSOs), and the private sector. The GEF states further that these relationships have been known and discussed for at least 50 years and that the correlation between gender and environmental issues is very important. This discussion started in the early 1970s “when the growing debate on environmental changes intersected with the emergence of studies on women’s roles in development and development policy strategies within the international women’s rights movement”.

According to the European Institute of Gender Equality (EIGE), substantial research has shown that gender differences in the impacts of climate change mean more casualties among women during extreme weather events and increased burden from care work. Evidence also exists of gender-specific consumption patterns that affect contributions to GHG emissions, and thus to climate change. For example, women spend more time at home due to the unequal share of care responsibilities, and thus depend on domestic heating to a greater extent. For mobility, women depend on access to public transport to a larger degree due to lower levels of car ownership, but also because of their preferences for the use of environmentally friendly solutions such as public transport. Due to their lower average income, women are at greater risk of energy poverty than men and have fewer options for investing in low-carbon options such as energy efficiency and renewable energies. According to EIGE, “(p)erceptions and attitudes towards climate change and climate policy options also vary substantially according to gender. Women are, on average, more concerned about climate change than men”.

According to a poll by Pew Research Center (Figure 1), the difference in opinion between men and women was highest in English-speaking countries, such as the United States, Canada, United Kingdom, and Australia. Women in South Korea, Spain, Germany, and Canada were found to be more concerned about climate change’s potential to do them harm:

As men and women have different roles in the family, community, and workforce, they are likely to have different personal attitudes, priorities, and power over resources when it comes to environmental protection. Men and women also interact differently with the environment, which provides them with different opportunities to protect it.

Figure 1. Gender gap on climate change in many wealthy nations



All this requires that strategies for promoting environmental protection at the country, local, and community level approach men and women differently. As way of example, promoting local products to reduce environmental threats in a small community could be addressed to men and women in different ways, as in many countries, traditionally it is still typically the “role” of women to do grocery shopping. Another example could be that in most households women are responsible for water and waste management (Acabal Masgon and Gensch).

However, due to their often-restricted access to public positions and political participation, decisions about water and waste management systems in the community are often taken by men who do not necessarily consider the views and needs of women household managers (OSCE). Consequently, the goal of gender mainstreaming environmental protection is to promote equal opportunities for men and women as participants and beneficiaries of environmental protection by considering their different positions and knowledge with regard to the environment. This includes producing and disseminating information about environmental protection that reaches both women and men and recognises their different roles and priorities in relation to the environment.

Political Actions taken on the EU Level

European Commission

In its EU Gender Equality Strategy 2020-2025, the European Commission (EC) states that “upcoming policies under the European Green Deal (...) can impact women differently to men”. In the Strategy, the EC commends the role of young women in tackling climate change and reiterates that climate change policies affect men and women differently. For example, “there are less possibilities for women as climate refugees”, “there are more women in energy poverty”, and “more women use public transport”.

However, in the European Green Deal itself, published in December 2019, none of the above was mentioned (Heinrich Böll Stiftung Brussels office), and the paper is gender-neutral in that it does not attend to the different positions and needs of diverse women and men.

European Council

The 2009 European Council Conclusions on climate change and development underlined “the human dimension of climate change, including a gender perspective, and that poor people are most at risk, and that their resilience to climate change needs to be strengthened”. The document also refers to gender equality and women’s empowerment at the end of paragraph 6. This relates to support for programmes that contribute to a low-carbon and climate-resilient development path and adaptation to the adverse impacts of climate change: “In providing such support special attention should be paid to gender equality and women’s empowerment”.

The 2012 Council Conclusions on Gender Equality and the Environment stated that enhanced decision-making, qualifications, and competitiveness in the field of climate change mitigation policy in the EU play an important role in the focus assigned to gender issues throughout EU environmental policies. Paragraph 1 of these conclusions, which were informed by the report on gender and climate change commissioned by the Danish Presidency and produced by EIGE, recognise that: “Women play a vital role in sustainable development, and that gender as well as social and employment aspects need to be integrated into efforts to combat climate change in order to improve them”. In 2011, the Council stated in its conclusion on the European Pact for gender equality for the period 2011-2022 that:

(w)omen and men affect the climate differently: their consumption patterns are different and they have different CO2 footprints, and they are not represented equally in decision-making in this field (...). Studies show that women and men also have different perceptions and attitudes towards climate change: women are in general more concerned about this issue and more motivated to act. Women’s potential as agents of change needs to be recognised.

In addition, the conclusions stress that:

There is an urgent need to improve gender equality in decision-making in the field of climate change mitigation, especially the transport and energy sectors, and to increase the number of women with relevant qualifications in scientific and technological fields as well as the number of women participating in relevant scientific bodies at the highest level (paragraph 9).

They claim that gender-based prejudices and stereotypes exclude women from areas of the green economy such as transport and energy, causing human resources to be wasted and preventing the EU from achieving its full competitive potential.

The Council calls on Member States and the EC to take active and specific measures aimed at achieving a balanced representation of women and men in decision-making in the field of climate change mitigation at all levels, including the EU level; to support women in science and technology at national and European level; to eliminate gender stereotypes and promote gender equality at all levels of education and training, as well as in working life; and to integrate the principle of gender mainstreaming into all relevant legislation, policy measures, and instruments related to climate change mitigation. It calls on the EC to provide guidance for gender mainstreaming of policy areas; to consider focusing on the issue of women and climate change

in one of the future reports; and to take action, with the participation of civil society, to raise awareness about the gender dimension of climate change policy (Allwood, 2014).

European Parliament

The European Parliament (EP) has been very active in this field since 2011, producing several resolutions which address climate change from a gender perspective. For example, in the EP resolution of 29 September 2011 on developing a common EU position ahead of the UN Conference on Sustainable Development (Rio+20), Article 19 emphasises that the Rio+20 Summit should discuss an integrated approach to address multiple challenges such as poverty eradication, health, food, employment, gender equality, climate change, and energy supply.

The EP resolution on women and climate change is explicitly concerned with exposing and addressing the links between climate change and gender. In Article 8, it calls on the EC and Member States to collect country-specific and gender-disaggregated data when planning, implementing, and evaluating climate change policies, programmes, and projects, so as to effectively assess and address the differing effects of climate change on each gender, to produce a guide on adapting to climate change, outlining policies that can protect women, and to empower women to cope with the effects of climate change. Article 20 calls on the EC and Member States to integrate gender in strategies for preventing and managing the risks associated with natural disasters, to promote women's empowerment and awareness through capacity-building before, during, and after climate-related disasters, and to further their active involvement in disaster anticipation, early warning systems, and risk prevention as part of their role in resilience-building. Article 35 stresses the important role played by women in implementing mitigation measures in daily life, such as through energy- and water-saving practices, recycling measures, and the use of eco-friendly and organic products. Article 42 stresses the need for financing mechanisms to reflect women's priorities and needs, and for the active involvement of organisations that promote gender equality in the development of funding criteria. This includes the allocation of resources for climate change initiatives, particularly at the local level and in the activities of the Green Climate Fund (EP, 2012). The EP calls on "the Commission and the Council, in order to ensure that climate action does not increase gender inequalities but results in co-benefits to the situation of women, to mainstream and integrate gender in every step of climate policies, from conception to financing, implementation and evaluation".

Article 4 of the EP resolution of 11 September 2012 on women and the green economy calls on the EC and Member States to compile age- and gender-disaggregated data when strategies, programmes, and budgeting projects are being planned, implemented, and evaluated for the environment and climate sectors. Article 5 calls on the EC and Member States to establish gender mainstreaming mechanisms at international, national, and regional levels in environmental policies, as gender concerns and perspectives are not well integrated in policies and programmes for sustainable development. The resolution includes other recommendations regarding gender aspects of the environment and the green economy in general, as well as particular recommendations relating to sustainable consumption, sustainable transport, the welfare sector, "green" jobs, and sustainable policies in international relations. On the EU Strategy for Equality Between Women and Men Post 2015, the EP calls on the EC to gather

gender-specific data with a view to conducting an impact assessment for women in the areas of climate, environment, and energy. This has not been done yet (Florence School of Regulation).

The resolution stresses the EU's responsibility and role as a model for gender equality and women's rights, and underlines that women are not only more vulnerable to the effects of energy supply and use, environment, and climate change, but also effective actors in relation to mitigation and adaptation strategies, as well as a driving force for an equitable and sustainable model of growth.

The EP resolution of 2019 is on climate change and a European strategic long-term vision for a prosperous, modern, competitive, and climate neutral economy in accordance with the Paris Agreement, as a gender-neutral document. This is not the case for the EP resolution from 2020. In this document, the EP "emphasises the need for a gender perspective on actions and goals in the Green Deal, including gender mainstreaming and gender responsive actions" and calls on the EC:

in its efforts to promote the EU as leader of international climate and biodiversity negotiations to design a concrete action plan to deliver on the commitments of the renewed five-year Gender Action Plan agreed at COP25 (Enhanced Lima work programme), to promote gender equality in the UNFCCC process, and to appoint a permanent EU gender and climate change focal point, with sufficient budget resources, to implement and monitor gender-responsible climate action in the EU and globally.

Finally, the Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law') includes a gender perspective in Article 9:

The Commission shall use all appropriate instruments, including the European Climate Pact, to engage citizens, social partners and stakeholders, and foster dialogue and the diffusion of science-based information about climate change and its social and gender equality aspects.

Further, the Regulation obliges the European Scientific Advisory Board to be gender-balanced (Article 12 (1)).

Legal Instruments at the EU Level

Many of the national legislations of the 27 EU member states are directly influenced by EU law because EU regulations oblige member states and individuals directly, and EU directives must be transposed into national law.

There is no EU directive or regulation directly linking gender and environment, apart from the above-mentioned articles 9 and 12 of the "European Climate Law". However, this link is still quite weak and does not oblige EU members states to take any actions. Therefore, on the EU level, the link between gender and environment must still be drawn by gender mainstreaming.

What is the legal basis for gender mainstreaming on the EU level?

Gender mainstreaming was established internationally as the major global strategy for gender equality at the United Nations Fourth World Conference on Women in Beijing in 1995, where the concept was promoted by the EU. It became the official policy approach in the EU and its Member States in the Amsterdam Treaty (1997), and the legal basis was strengthened in Article 8 Treaty on the Functioning of the European Union (TFEU), which commits both to eliminating inequalities and promoting the principle of equality between women and men in all their actions. The EU has adopted a twin-track approach of incorporating a gender perspective across all sectors, and specific positive action for women to eliminate, prevent, or remedy inequalities, first set out in the 1996 communication on incorporating equal opportunities for women and men into all community policies and activities. On its introduction, it was noted that gender mainstreaming was not only a potentially revolutionary concept, but also an extraordinarily demanding one, which required the adoption of a gender perspective by all the central actors in the policy process, who might have little experience or interest in gender issues. Each EU institution had its own system and would have its own challenges.

What is gender mainstreaming?

In some areas, such as education and employment, the gender dimension is evident. In others, such as climate change and environmental fields, it may be less immediately apparent. Yet, across the spectrum, including in these seemingly “gender-neutral” fields, policy may have different impacts on women and men and may inadvertently perpetuate inequality or discrimination. One of the tools that has been developed to ensure that these impacts are considered is “gender mainstreaming”. As defined by the European Commission in 1996, it means “not restricting efforts to promote equality to the implementation of specific measures to help women but mobilising all general policies and measures specifically for the purpose of achieving equality”. EIGE defines it as:

a strategy towards realising gender equality. It involves the integration of a gender perspective into the preparation, design, implementation, monitoring and evaluation of policies, regulatory measures and spending programmes, with a view to promoting equality between women and men, and combating discrimination.

Gender mainstreaming is not just about women, but about ensuring that women’s as well as men’s experiences and concerns are built into the design, implementation, monitoring, and evaluation of policy, legislation, and spending programmes and that both individual rights and structural inequalities are addressed. It also entails looking at institutions and how they work, including gender representation within policy areas and decision-making structures.

Health/Cancer Living Lab

As for the LL AI and climate change, there is also no mentioning of gender equality or race in the documents related to the LL health/cancer. In the following it shall be discussed why and in which way this specific field has gender and race differences.

Research integrity and gender/race

Rasmussen (Miller, 2022), in the first block, "Authorship and Publications", presents five theses according to which gender-specific behaviour correlates with research integrity:

1. Firstly, there is a gender difference in the acceptance of publications. Far fewer articles would be accepted from women than from men, although they had submitted just as many. Rasmussen (Miller, 2022) substantiates this with a study by Symonds et al (2006). The authors of this study examined the publications of 168 bioscientists from the fields of ecology and evolutionary biology in order to assess the gender-specific differences in research performance. The authors explain that clear discrepancies in publication rates between men and women become apparent very early in the careers of scientists. These in turn have an impact on the later citation of their work.
2. Rasmussen's second thesis is that there are differences between the sexes with regard to the first publication, because women usually publish later than men. Rasmussen backs this up with a study by Feldon et al (2017). The authors of this study show that in a national cohort of 336 first-year doctoral students from 53 research institutions in the life sciences (i.e. microbiology, cell biology, molecular biology, developmental biology and genetics), the female participants performed significantly more research hours than their male colleagues (Feldon et al., 2017). In addition, female participants were significantly more likely than male participants to report that they attributed their hours to the demands of their assigned projects during the academic year. Nevertheless, men were 15 per cent more likely to be listed as authors in published journal articles, indicating an unequal relationship between time and effort. Given the cumulative advantage that accrues to students who publish early in their academic careers and the central role that scholarly productivity plays in academic hiring decisions, these findings as a whole point to an important potential cause for the persistent underrepresentation of women on university faculties in these fields (Feldon et al., 2017).
3. Rasmussen's third thesis states that there is a difference in the manner of auto-citation, with female scientists citing themselves less frequently than their male colleagues. She refers here to King et al. (2017). Using novel methods and a dataset of 1.5 million research papers in the JSTOR scholarly database published between 1779 and 2011, the authors find that almost 10 per cent of references in a publication are self-citations by the author. The results also show that men cited their own work 56 per cent more often than women between 1779 and 2011. In the last two decades for which data are available, men have written 70 per cent more self-citations than women. Women are more than 10 percentage points more likely than men to not cite their own earlier work at all. While these patterns may be due to differences in the number of papers published by men and women rather than gendered patterns of self-citation behaviour, this gender gap in self-citation rates has increased by 14 percentage points over the past 50 years despite the increasing representation of women in academia. King et al. break down the self-citation patterns by academic field and number of authors and explain possible mechanisms behind these observations. These findings have important implications for scientific visibility and cumulative advantage in academic careers (King et al., 2017).
4. Rasmussen's fourth thesis is that there is a difference in the first and last author inside positions, with women tending not to be in these prestigious positions. She refers to an analysis by West et al. (2013). Their large-scale analysis based on more than eight million publications in the natural sciences, social sciences and humanities reveals a number of

inequalities between male and female scientists. Even where the number of publications appears to be equal between the sexes, a closer look reveals that in certain fields men predominate in the prestigious positions of first and last authors. Furthermore, women are significantly underrepresented as authors of papers that have only one author. Researchers should be aware of the subtle ways in which gender inequalities in scientific authorship can occur.

5. Rasmussen's final thesis is that anonymous peer review of publications or projects leads to more prizes and honours for women scientists (Bhattacharjee, 2012).

In the second block, Rasmussen deals with scientific cooperation. Here she puts forward three theses according to which gender-specific behaviour correlates with scientific integrity.

1. First, she argues that a non-collegial work environment causes more misconduct and substantiates this with a study conducted by Fisher et al. (2009). Edmondson (2019) also argues that non-existent psychological safety causes more misconduct and ultimately less success in groups or organisations. However, neither Fisher nor Edmondson disaggregated their research by gender, so Rasmussen's thesis is not helpful to the initial question of the correlation between gender and academic integrity.
2. Rasmussen's (2019) second thesis is that women's participation in research groups has a positive impact on collaboration, and provides evidence for this in Bear and Woolley (2011). As women continue to be underrepresented in STEM subjects and scientific innovation increasingly comes from team collaborations, Bear and Wolley (2011) reviewed the existing literature on the impact of gender diversity on team processes and performance. Recent evidence strongly suggests that team collaboration is greatly enhanced by the presence of women in the group, and this effect is mainly explained by benefits to group processes. The evidence regarding the impact of gender diversity on team performance is ambiguous and depends on a variety of contextual factors. Given the importance of collaboration in science, promoting the role of women in this area can have positive practical consequences for science and technology.
3. Thirdly, Rasmussen posits that a competitive environment has a negative impact on female scientists, based on the research of Anderson et al (2007). However, the authors themselves did not break down their results by gender, which is why Rasmussen's thesis may be correct, but it is not (yet) substantiated in her piece.

Rasmussen's second thesis, see above, states that there is a difference in perception between female scientists and their male colleagues regarding their own contributions in group work: Scientists value their own contribution more highly than that of their female colleagues. Rasmussen supports this with analyses by Macaluso et al. (2016) and Reese (2013). Van der Hooven (2021) also confirms this thesis.

The last block deals with cognitive biases in methodology. Here Rasmussen puts forward four theses.

1. First, using single-sex animals can bias research results (Editorial Board, New York Times, 2015). A study published in the journal Nature Neuroscience suggests that results obtained

from research on male animals may not be equally useful for women as for men. The authors of the study report that hypersensitivity to pain, for example, functions differently in male and female mice. In male animals, immune cells called microglia seem to be partly responsible for pain hypersensitivity and inhibiting their function also alleviates pain. In female mice, however, other cells are involved and targeting the microglia has no effect. If these differences occur in mice, they could also occur in humans. As a result, a painkiller that targets the microglia might not have the same effect in women as it does in men.

2. Furthermore, Rasmussen posits that the use of descent categories can result in a cognitive bias. Rasmussen's argument is intersectional. On the one hand, this means that not everything should be discussed solely from the perspective of biological gender (i.e. differences between men and women), but that this discussion should open up to social gender. On the other hand, it also means that not only the white woman serves as a yardstick, but that as far as possible all women can either find their place and be heard as scientists or even become study participants without being discriminated against and stigmatised.

Rasmussen supports her thesis with Kaplan and Bennett (2003). They have analysed that scientists, physicians and policy makers face three challenges when writing or deciding about ancestry and ethnicity. First, they have to take into account some legal restrictions on ancestry and ethnicity data. In addition, they often face the distinction between ancestry and ethnicity as a risk factor or as a risk marker in a negative sense. Moreover, they should find a way to write about ancestry and ethnicity that does not stigmatise and does not imply a dichotomy of "us" and "them" between health professionals and non-white populations. In this sense, Perez Rodriguez and Fuente (2017) explain that accounting for ancestry differences in the biology of disease and treatment options is a hallmark of modern medicine. However, Perez Rodriguez and Fuente (2017) question this. They argue that it has no scientific basis and that the premise itself, namely the existence of biological differences between commonly known "races", is false insofar as "races" are only socio-cultural constructs. They then conclude that it is time to rid medical research of the harmful search for supposed racial differences in the biological manifestations of disease. Indeed, the practice of using ancestry identification as a demographic characteristic with assumed biological implications, not only condoned but required by the National Institutes of Health (NIH), is at best deeply flawed and at worst inadvertently contributes to perpetuating the fallacy of natural differences between persons of different skin colour that has been used in the past to promote ancestry discrimination.

3. Rasmussen's third thesis refers to racism and sexism. These have often led to questionable use of study participants, as Germans in particular know from their own past and the Nazi crimes. Rasmussen initially substantiates her own thesis with Garrison (2013). In his article, Garrison summarises the impact of the famous Havasupai case on genetic research (Garrison, 2013). In 2004, the Havasupai tribe filed a lawsuit against the Arizona Board of Regents and researchers at Arizona State University (ASU) after members of the tribe discovered that their DNA samples, originally collected for genetic studies on type 2 diabetes, had been used in several other genetic studies. The lawsuit was settled in April

2010, providing financial compensation and the return of the DNA samples to the Havasupai, but without legal precedent for the scientists.

Subsequently, institutional review board (IRB) chairs and human genetics researchers at US research institutions provided their perspectives on the Havasupai lawsuit in semi-structured interviews. According to the interviewees, the lawsuit has drawn attention to indigenous peoples' concerns about genetic studies and raised their own awareness of the views of this population group. However, interviewees did not see any direct impact of the Havasupai case on their work - if they did, it was the perceived need to protect themselves by each seeking broad consent to do so or withdrawing from research with Indigenous communities altogether. However, this raises important questions of justice for participants who belong to indigenous groups or other minorities. Unless scientists and IRBs change their practices in light of this case, these populations are likely to continue to be excluded from the majority of research studies and have less access to resources and potential benefits from participating in genetic research (Garrison, 2013). It would therefore be of great interest to the scientific community to find a responsible way of dealing with study participants from indigenous and/or minority groups without discriminating against, stigmatising or excluding them.

4. Rasmussen's last thesis concerning the supervision of students by mentors from other cultural groups fits in with this: The latter would then be more likely to conduct research on minority groups than students supervised by mentors from the same cultural groups. Rasmussen substantiates this with Fischer et al (2013).

Sextortion in science

Respect and respectful interaction with each other are essential principles within scientific integrity, which is laid down in the European Code of Conduct of Research Integrity (mentioned by the IntelComp Consortium in section 5.1). Of course, this also applies to interactions between academics and between academics and other stakeholders - such as their behaviour towards students or doctoral candidates. Factors that undermine this respect are sexual harassment or other sexual offences. Already in 2018, the scientist Erika Marín-Spiotta demanded in the journal *Nature* that scientific integrity should also apply to scientists' dealings with people, not only to their dealings with data (Marín-Spiotta, 2018). In her article, she referred primarily to the frequent incidents of sexual harassment or other sexual offences in the scientific environment. Marín-Spiotta goes so far as to call for sexual harassment to be classified as scientific misconduct.

Sexual offences committed by persons in a position of power are sextortion. To the author's knowledge, sextortion as such has not yet been addressed in academia. Overall, it is probably primarily a problem that affects women as victims, although men can also experience sexual harassment in scientific settings, albeit to a lesser extent than women (Witze, 2018). A study published in 2016 found that female doctoral students at a public university in the Pacific Northwest of the USA were 1.64 times more likely than male colleagues to have been sexually harassed by faculty or staff members (Witze, 2018).

Assessment in science

Another aspect of respectful interaction in scientific integrity is in the area of evaluation. Towfigh et al. (2018) conducted a study showing that women and non-German examinees are often discriminated against in the evaluation of legal trainees. Among other things, the study came to the conclusion that women perform almost 2 per cent worse than their male colleagues in the second state law examination. Above all, female legal trainees are much worse off than their male colleagues with regard to the predicate marks, which are so important for lawyers, because 12 per cent more female legal trainees achieve the extremely career-relevant mark threshold of 9 points. This is relevant because only those with a grade of 9 points or better can be admitted to the civil service. The three authors of the study also found that other factors such as Abitur grade, age and examination date further increase the statistical differences between male and female examinees.

According to Rasmussen (2019), an immigrant background also leads to lower grades. Legal trainees from abroad without German citizenship perform 17 per cent worse in the second exam than German candidates. They are even 70 per cent less likely to achieve a distinction. Examinees born in Germany with a German passport but a "non-German" name are also assessed worse on average. The differences remain even when previous grades are included in the analysis.

The authors assume - possibly unconscious - discrimination by female examiners. This can be prevented in oral examinations by having at least one woman on the examination board. For the authors, on the other hand, it is not yet clear how discrimination against examinees with a migration background can be reduced or prevented, because the number of female examiners with a migration background is currently still too small to be able to make empirically sound statements about this (Towfigh et al., 2018).

One researcher on the issue of victims of sexual harassment and their supporters is Ana Vidu (Vidu et al., 2017). Among other things, Vidu calls for protection for the victims' supporters in order to prevent them from becoming victims themselves, so-called victims of second-degree sexual harassment.

Pandemic and scientists

The pandemic had and still has an extreme impact on men and women, with studies showing that the impact on gender is different (Miller, 2020). When in April 2020 experts of the German National Academy of Sciences Leopoldina published recommendations on the gradual exit from the state of social emergency due to the Corona pandemic, a public outcry followed. Firstly, the composition of the body was criticised, whose members had an average age of 60 and included only 2 women compared to 24 men (Parbey, 2020). Furthermore, the Leopoldina working group was criticised for not addressing the well-being of women (Burchard, 2020).

A September 2020 study suggests that this problem is a global one and that, in general, the news often fails to take women's perspectives (Kassova, 2020). According to the study, US and European women scientists have recently expressed their despair at the struggle against patriarchy in science, as well as their marginalisation in the Corona pandemic (Kassova, 2020). As an example, the study notes that news reports quote men as experts four times more often

than women (Kassova, 2020). This is supported by Squazzoni et al. (2020), a male-only author team whose study of manuscript submissions and reviews in 2,329 Elsevier journals during the pandemic found that women submitted proportionally fewer manuscripts than men during the first wave of the pandemic. This deficit was particularly pronounced among younger cohorts of female academics. A less marked gender pattern emerged in the acceptance of peer review invitations. Squazzoni et al. attribute these findings to the fact that the first wave of the pandemic potentially created cumulative advantages for men. Since most scientists were forced to work from home, the competing demands of family responsibilities may have affected women's scientific productivity.

Research objects

The pandemic has also revealed that women's needs tend to be secondary in research. For example, women worldwide report worse side effects after COVID vaccinations than men (Deutsche Welle, 2021). However, valid data is hard to find because most studies so far ignore biological and social sex (Brady et al., 2021). However, Brady et al. explain that gender differences affect the incidence of SARS-CoV-2 infection and COVID-19 mortality. In addition, gender differences influence the frequency and severity of pharmacological side effects. Numerous clinical trials are currently underway to develop new therapeutic approaches and vaccines for COVID-19. Brady and others (2021) examined the inclusion of sex in COVID-19 trials on ClinicalTrials.gov and collected data for the period 1 January 2020 to 26 January 2021 (Brady and others, 2021). Here, they showed that of the 4,420 registered SARS-CoV-2/COVID-19 trials, 935 (21.2%) address gender exclusively in the context of recruitment, only 237 (5.4%) plan to use gender-adjusted or representative sampling or emphasise gender reporting, and only 178 (4%) explicitly report a plan to include gender as an analytic variable. Only eight (17.8%) of the 45 COVID-19-related clinical trials published in scientific journals by 15 December 2020 report sex-disaggregated results or subgroup analyses.

After many Spanish women wondered about a change in their monthly menstrual cycle after their vaccination, researcher Laura Baena decided to study the "Effect of SARS COV-2 vaccination on the menstrual cycle of women of childbearing age Project Eva" at the University of Granada (Espinosa, 2021). So far, Baena has found that the most common effects are increased bleeding, changes in cycle length and even intermenstrual bleeding (women bleeding at the time of ovulation). However, there is a lot of variability: there are women with amenorrhoea, but at the same time there are menopausal women who bleed again, although these tend to be isolated cases (Espinosa, 2021).

To make matters worse, it is generally difficult for women in innovation and research to find funders and investors to carry out their research projects or start innovative companies (Hassan et al., 2020). On the one hand, this may be due to the "pitch", i.e. the short application speech, and the way women present their projects. Another cause may be the content of the projects, which often have a rather social character and are considered unsuitable by the mostly male investors.

Cancer and women

A Comment published in The Lancet Oncology in 2021 presents and discusses the little-known finding that close to two thirds of the total cancer cases in young adults (ages 20–49 years) are diagnosed in women (Vaccarella et al, 2021).

Vaccarella et al highlight the fact that three cancer types that affect exclusively or predominantly women – breast cancer, cervical cancer, and thyroid cancer – are the major contributors to the total cancer burden in young adults. The underlying reasons for the inequality in cancer incidence between the sexes in this age range are diverse in nature and impact, and are associated with unequal access to and inefficiencies in the health-care system and with socioeconomic conditions.

The authors emphasize the potentially catastrophic consequences of a cancer diagnosis, particularly when it occurs in younger women.

Based on the above, it is important that the LL health/cancer included experts in women and cancer (e.g. Dr Pilar Garrido, first woman President of the Spanish Medical Oncology Society) in the forthcoming event.

Recommendation #1

It is highly recommended that, in the following (and last) events of the three LL, experts in gender equality and vulnerable population participated in the AI, climate change and cancer LL.

2.2.2. Personal data protection

As mentioned by the IntelComp Consortium, the only personal data collected is information of the Task 7.1. Project dissemination and communication, and Task 7.2. Engagement and training. IntelComp partners have signed a Joint Data Controller Agreement and personal data is processed in IntelComp according to this agreement (see IntelComp Power Point presentation at the 1st General Assembly Meeting - Item 6. Status of WP9). IntelComp has already fulfilled all three personal data related ethics requirements which have been submitted to EC (IntelComp 2nd General Assembly Meeting - Update on WP9 (Ethical Issues)), with a Data Protection Officer working in the project.

The area of data protection seems to be sufficiently taken care of and nothing else seems conspicuous here.

Only one comment can be made:

D9.3 describes the organizational and technical measures that are implemented in the IntelComp project to safeguard the rights and freedoms of the data subjects and research participants whose personal data will be collected and processed. The IntelComp partner University Carlos III of Madrid (UC3M) is the owner of the Google Drive where the personal data has been stored, its confidentiality being guaranteed by the UC3M contract with Google. Google maintains geographically distributed data centers. Google stores all production data in physically secure data centers. Google guarantees by processor contract to UC3M the location of the data in the EU.

Recommendation #2

It is highly recommended that Google guaranteed to UC3M that the backup related copies are also located in EU, and furthermore, that there is no access by Google or any third party related to Google and not part of the IntelComp consortium (companies, AI, robots, crawler bots or individuals) to confidential information hosted in that server.

2.2.3. Artificial intelligence

AI is in the heart of IntelComp components (section 5.1). In relation with AI related ethics issues, this report refers to the Human related ethics issues (above) discussed for the LL AI.

It is furthermore recommended that the IntelComp does an external AI audit after one year of running the AI tool(s).

“(T)hird-party audits are done by independent entities who often represent an impacted group and have no contractual relationship with the company. These audits are directed at a very specific evaluation that has potential repercussions and consequences. And these audits can address harms that go beyond bias to include ecological, safety, or privacy impacts as well as a system’s failure to live up to appropriate standards for transparency, explainability, and accountability.” (Miller, 2021).

Recommendation #3

It is recommended that IntelComp realized an external audit of its AI related tool(s) after 1 year of its working.

2.2.4. Other ethics issues

So far, no other ethics issues have been discovered.

2.3. Conclusion

This ELSI analysis has found nothing unusual regarding the legal aspects of data and the interaction of IntelComp with content providers (commercial or public) and users. The specific risks (personal data collected is information of the Task 7.1. Project dissemination and communication, and Task 7.2. Engagement and training) have been detected and have been mitigated by the Joint Data Controller Agreement and a DPO.

The only area where something should be done from an ethical point of view, and with a possible later social impact, is the involvement of experts in the interfaces of women's rights and minority protection and the areas of AI, climate change and cancer.

This can be done by inviting experts to the final events or - in the case that no events take place - by writing for feedback.

Finally, an external audit of the AI tools should be done one year after its use to check its “system’s failure to live up to appropriate standards for transparency, explainability, and accountability” (Miller, 2021).

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ANNEX 1: COMMENTS BY THE ETHICS ADVISORY BOARD

The recommendations are appropriate, and it is right to include a gender perspective, protection of vulnerable groups, strengthened privacy (vis-à-vis corporations like Google) and to consider environmental impacts.

Concerning Humans -> LL Health/Cancer -> Cancer and women

Another example may be added with respect to cancer, women, and race. An article that shows the importance of collecting data by gender and race is the following: "Researchers are grappling with the question whether it's possible to separate race from our understanding of cancer"⁸.

Concerning Recommendation #1

The opinions of the experts in the interfaces of women's rights and minority protection and the areas of AI, climate change and cancer, in relation to the development of the platform should be included as soon as possible. Otherwise, any comment or advice that they can give at this stage will cost time the technical team time and improvements that may not be implemented due to deadlines or lack of budget. It's very important that their opinion can be incorporated as soon as possible.

Concerning Recommendation #2

Why does the University of Carlos III (UC3M) use a private platform like Google to collect and process the personal data? Is it not technically possible to store these data on a server from UC3M?

Concerning Recommendation #3

These audits should be scheduled annually.

ANNEX 2: COMMENTS BY THE CONSORTIUM

Concerning Humans -> LL Health/Cancer

This section is very high-level, more like a generic literature review, not IntelComp specific. It's good to know the background, but the consortium also needs specific information for the IntelComp project.

Concerning Artificial Intelligence

This section refers to the Human related ethics issues discussed for the AI Living Lab. The external provider may give examples of the information analysed via AI that are more related to the IntelComp tools and services.

Regarding the examples of algorithmic discrimination, the consortium would expect a more specific approach for IntelComp. The information on the services included in the IntelComp

⁸ <https://race.undark.org/articles/a-crude-tool-how-race-has-influenced-breast-cancer-research>

Catalogue may be analyzed by the external provider, e.g. version of algorithms, history log, output description, etc.

Notwithstanding, AI related bias issues raised by the ELSI analysis are not an issue for IntelComp as the consortium is not working with individual data. The consortium performs agglomerative analysis based on the text description of publications, research projects, etc. but does not use, e.g. the names of authors of the works or their gender.

The consortium does not carry out an analysis of research production based on gender, etc. which could be subject to the issues raised by the ELSI report. Through there are biases underneath the research output (e.g., publications), which are different in different research fields and sub-fields, trying to counter them as project would raise new and probably much bigger concerns.

There is no human labelling in the datasets the consortium uses. All datasets are created as collections of existing datasets of scientific data; there is no subjective process involved. e.g., manual labelling of projects, etc.

The consortium does not consider that the IntelComp services and tools can be affected in any way by subjective biases. There is no room for any bias-related concerns in the kind of tools and services the consortium develops, as they are not going to be used to provide automatic decisions at an individual level.

Concerning Recommendation #1

The definition and people that might belong to a vulnerable group may need to be explained by the external provider. This definition may change depending on the domain: AI, impact of climate change or cancer.

The recommendation implies inviting representatives from vulnerable groups, including women. It may apply to the civil society organizations that participate in the living labs.

Concerning Recommendation #2

This recommendation would imply a change in the contract conditions of the University following the ELSI report. As this is not feasible, what the consortium may do is share the concerns with the university.

Nonetheless, confidentiality is guaranteed by the UC3M contract with Google and all personal data in the Drive is controlled by UC3M, as the owner of the drive. Personal data is processed in a manner that ensures appropriate security and confidentiality of the personal data, including preventing unauthorised access to or use of personal data and preventing unauthorized access to the equipment used for the processing.

Concerning Recommendation #3

This recommendation may not be applicable to IntelComp, as explained in the comments regarding Artificial Intelligence.

Moreover, this recommendation depends on the sustainability plan and if the partners agree to keep everything online running for one year at least. The content of this audit may need to be detailed by the external provider.

References

Two references seem missing: AI HLEG (2019) and Drell (2001).

CINECA Project - Catalogue of ELSI Issues. It may be better to use the Zenodo link instead, because project websites deactivate at a time and files would not be found <https://zenodo.org/record/3943732>

PART II. ELSI REPORT (DECEMBER 2023)

EXECUTIVE SUMMARY

This is an update to the ELSI Analysis dated 29 June 2023 and it finalizes with the following recommendations:

Recommendation on the ethics issue ARTIFICIAL INTELLIGENCE:

- If the decision of the IntelComp Consortium is based on the conclusion, that “bias issues raised by the analysis (dated 29 June 2023) are not an issue for IntelComp as the consortium is not working with individual data”, then this updated report dated 15 December 2023 recommends to reconsider the Consortium’s decision, basing their final decision on the 10 items mentioned in the updated ELSI Analysis.

Recommendations on OTHER ETHICS ISSUES:

- It is recommended to include disaggregated data on anti-discrimination in the datasets in the IntelComp Catalogue, only and if the dataset owners/providers are able to provide this information.
- It is recommended to open a debate amongst IntelComp members on whether or not to use the platform “X” (formerly known as “Twitter”) as dissemination channel.
- It is recommended to check if energy consumption in case of backup for a substantial amount of data like 7.5 Terabytes (TB) can be optimized to ensure efficiency and cost-effectiveness.
- It is recommended to mitigate risks of ethics issues raised in point 6.1.1 “Are there any ethical or legal issues that can have an impact on data sharing? == YES” with respect to the following datasets in the DMP: EU-GR Energy & Agrifood ESG Analytics; EU-GR Energy & Agrifood Regulations Set; EU Energy & Agrifood Enriched Patent Set; Topic model of Semantic Scholar documents in the domain of Artificial Intelligence; SciNoBo classified scientific publications (AI & Energy domains); EU-GR Green Skills Dataset; EU-GR Energy & Agrifood Industry Analytics. This can be done by including supervision of Ethics Manager and/or explanation and justification why the data is kept internal and only for internal use.

1. INTELCOMP ELSI REPORT

The ELSI analysis from 29 June 2023 has been integrated in the D8.4 Legal and ethics management report.

This document dated 15 December 2023 is an update which is based on the following IntelComp related documents:

- D1.2. Report on the selected measurement and data collection
- D2.2. Data ingestion and ETL tools
- D2.4. STI Data Space design and schema generation scripts, with associated documentation about the DB structure – final version
- D2.5. IntelComp STI Data Space – final version
- D8.4. Legal and ethics management report. Version 2.3
- D8.5. Data Management Plan – final version
- 3rd General Assembly Meeting (11 October 2023) presentations
 - Item 11 - Summary of Key Action Points
 - WP2_11_OCT_2023
 - WP6_General_Assembly_Madrid_2023
 - WP7_General Assembly_111023_finalGA2
 - Item 8 - Update on WP8 and WP9
- List of organizations attending to events:
 - info day Greece
 - intelcomp_ai_living_lab_final_ev

2. UPDATED ELSI ANALYSIS

As already mentioned in the document dated 29 June 2023, this ELSI analysis applies normative and conceptual methods which follow the structure of the Ethics Appraisal Procedure of the H2020 Online Manual. It is an in-depth analysis of the ethical issues of the IntelComp project, taking into account, when available, the conclusions of the Ethics screening or previous Ethics assessment within IntelComp (see D9.1.-D9.4).

2.1. Humans

Related to this ethics issue the following recommendation was stated in the first ELSI analysis:

- In the following (and last) meetings of the three living labs AI, climate change and health/cancer, experts in gender equality and vulnerable population should be invited to the respective living lab meetings. This would bring in a necessary and new perspective to the three topics AI, climate change and health/cancer.

According to the document “3rd General Assembly Meeting (11 October 2023) presentations Item 8 - Update on WP8 and WP9”, IntelComp has included experts in gender equality and vulnerable population in its further development and realization of the living lab meetings. This is also reflected in the document “3rd General Assembly Meeting (11 October 2023) presentations Item 8 - Update on WP8 and WP9. Item 11 - Summary of Key Action Points”: ‘Invite

experts in gender equality and citizen associations representing vulnerable population to the STI Policy Participation Portal events (ARC and SEDIA)'.

Furthermore, the excel sheets "List of organizations attending to events "info day Greece" and "intelcomp_ai_living_lab_final_ev"" evidence the inclusion of civil society participants, in one case especially for women related issues as one representative of the association "Soroptimist" has participated at the event.

This update foresees no more recommendations regarding the ethics issue "HUMANS", but recognizes and applauds the effort done by the whole IntelComp Consortium.

2.2. Personal data protection

Related to this ethics issue, the recommendation stated as follows:

- It is highly recommended that Google guaranteed to UC3M that the backup related copies are also located in EU, and furthermore, that there is no access by Google or any third party related to Google and not part of the IntelComp consortium (companies, AI, robots, crawler bots or individuals) to confidential information hosted in that server.

According to "Annex 2. Comments by the consortium" in the first part of this deliverable, this recommendation "is not feasible. It would imply a change in the contract conditions of the University following our needs."

The update of the ELSI report does not include any more personal data protection issues.

2.3. Artificial intelligence

Related to the ethics issue ARTIFICIAL INTELLIGENCE the following recommendation was stated in the ELSI Analysis dated 29 June 2023:

- It is recommended that IntelComp realized an external audit of its AI related tool(s) after 1 year of its working.

According to "Annex 2. Comments by the consortium" in the first part of this deliverable, this recommendation may not be applicable to IntelComp, as "AI related bias issues raised by the analysis are not an issue for IntelComp as the consortium is not working with individual data".

However, the aim of an AI audit is not only to tackle bias issues mentioned in the ELSI Analysis dated 29 June 2023. An AI audit should also provide, for example, the following 10 items:

Data Collection and Management:

- Evaluate the quality, representativeness, and fairness of training data.
- Assess the data collection process for biases and potential sources of discrimination.
- Examine data governance practices, including data storage, security, and access controls.

Algorithmic Design and Functionality:

- Review the algorithmic models used, including their architecture and parameters.

- Assess the fairness of the algorithm in terms of outcomes for different demographic groups.
- Verify that the algorithm does not discriminate against protected characteristics.

Transparency and Explainability:

- Evaluate how transparent and interpretable the AI system is.
- Examine documentation and explanations provided for the decision-making process.
- Assess the system's ability to provide clear and understandable reasons for its outputs.

Version Control:

- Track and document changes made to the algorithm over time (version control).
- Ensure that updates are well-documented, and changes are transparent.
- Check for any unintended consequences introduced in newer versions.

Testing and Validation:

- Examine the testing methodologies used to validate the AI system.
- Assess the robustness of the system against adversarial attacks or unexpected inputs.
- Verify that testing includes scenarios relevant to different user demographics.

Bias Mitigation Strategies:

- Evaluate the presence of mechanisms to mitigate biases in both data and algorithmic outputs.
- Check for the implementation of fairness-aware techniques and algorithms.
- Assess the effectiveness of bias detection and correction strategies.

User Feedback and Impact Assessment:

- Collect and analyze user feedback on the AI system.
- Assess the real-world impact of the AI system on different user groups.
- Consider any disparities or unintended consequences in the system's deployment.

Compliance and Legal Considerations

- Ensure compliance with relevant regulations and legal frameworks.
- Assess whether the AI system adheres to privacy and data protection laws.
- Verify that the system complies with industry standards and guidelines.

Documentation and Reporting:

- Maintain comprehensive documentation of the audit process, findings, and recommendations.
- Provide clear and actionable recommendations for improvements.
- Communicate the results of the audit to relevant stakeholders, including developers, decision-makers, and end-users.

Continuous Monitoring and Improvement:

- Establish mechanisms for ongoing monitoring of the AI system's performance.
- Implement a plan for continuous improvement based on feedback, new data, and evolving ethical considerations.

Follow-up recommendation:

If the decision of the IntelComp Consortium is based on the conclusion, that *“bias issues raised by the analysis (dated 29 June 2023) are not an issue for IntelComp as the consortium is not working with individual data”*, then this ELSI Analysis recommends to reconsider the Consortium’s decision, basing their final decision on the 10 items (or more) mentioned above.

2.4. Other ethics issues

The ELSI Analysis dated 29 June 2023 followed the structure of the Ethics Appraisal Procedure of the H2020 Online Manual. It is an in-depth analysis of the ethical issues of the IntelComp project, taking into account, when available, the conclusions of the Ethics screening or previous Ethics assessment within IntelComp (see D9.1.-D9.4).

The Ethics screening or previous Ethics assessment within IntelComp (see D9.1.-D9.4) had not mentioned any OTHER ETHICS ISSUES. However, in “Annex 2. Comments by the consortium” in the first part of this deliverable, the consortium stated that “The information on the services included in the IntelComp Catalogue may be analyzed by the external provider, e.g. version of algorithms, history log, output description, etc.”

That’s why in the following, the ethical, legal and social aspects of the IntelComp Catalogue shall be discussed.

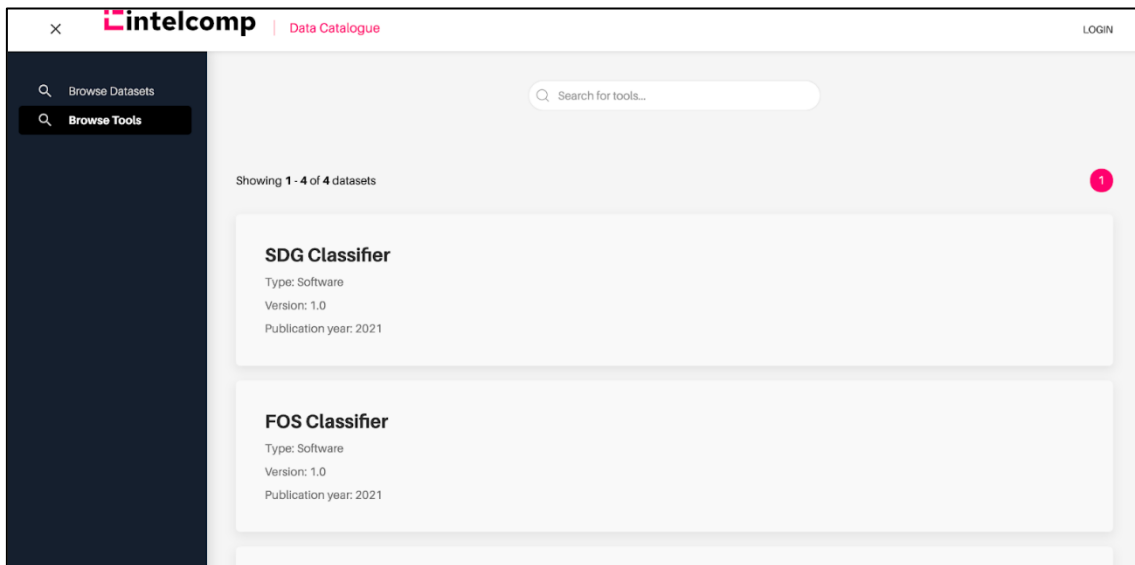
Furthermore, OTHER ETHICS ISSUES such as the use of social media (especially the usage of the application “X”), the energy consumption of data size and backups and the ethical and legal implications of data sharing shall be discussed.

2.4.1. IntelComp Catalogue

In the following it shall be discussed the ethical, legal and social aspects of the IntelComp Catalogue.

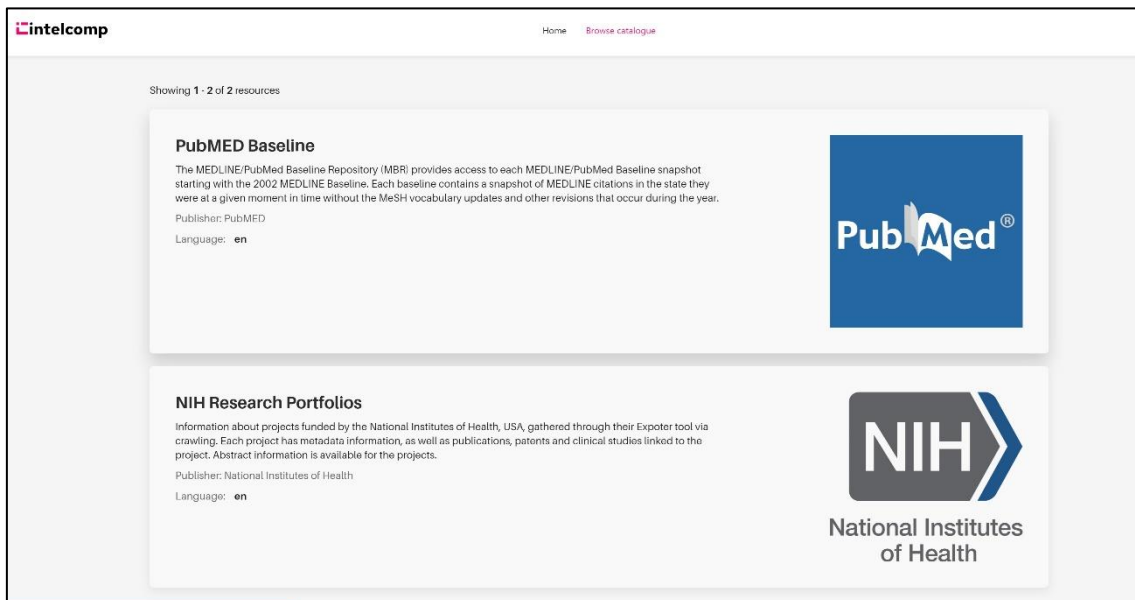
Figure 7. “Screenshot of the software services in the IntelComp Catalogue” in D2.4. “STI Data Space design and schema generation scripts, with associated documentation about the DB structure – final version” shows the following information or criteria (in the following, when referring to the description of the datasets in the IntelComp Catalogue, this report refers to as information or criteria):

Figure 2. Screenshot of the software services in the IntelComp Catalogue (taken from D2.4)



In Figure 7 from D2.4, one can see the criteria “output description”, “type”, “version of algorithms” and “publication year”. However, when using the IntelComp Catalogue as a third-party user, it shows the following (Figure 3):

Figure 3. Image of the IntelComp Catalogue (Source: MIK, 29 November 2023)



Here, you can only see the criteria “output description” and “language”. Any further information is missing. **Therefore, it is recommended to review the criteria which can be seen by third-party users.**

Additionally, **it is recommended to include more information on the datasets in the IntelComp Catalogue, only and if the dataset owners/providers are able to provide this information.**

In the following it shall be described to which information this report refers to, the reasoning behind the recommendation and this report gives detailed recommendations on the datasets mentioned in D2.5. IntelComp STI Data Space – final version.

Disaggregated data on anti-discrimination

It is recommended to include the following information or criteria (**again, only if available**) which is disaggregated data on anti-discrimination: sex, race, colour, ethnic or social origin, genetic features, language, religion or belief, political or any other opinion, membership of a national minority, property, birth, disability, age or sexual orientation; these are the protected grounds against discrimination, according to Directives 2000/43/EC, 2000/78/EC and 2004/113/EC.

In the IntelComp Catalogue it could be classified as additional information.

Reasoning behind the recommendation

The reasoning behind this recommendation is that the datasets showcased in D2.5 **could** also give valuable information on inequalities and deprivations that may not be fully reflected in aggregated data (UN Women, 2021).

As way of example, let’s discuss Table 2 Metadata of Horizon Europe, Horizon 2020 and FP7 Project Portfolio Dataset (page 12 of D2.5):

Figure 4. Table 2 Metadata of Horizon Europe, Horizon 2020 and FP7 Project Portfolio Dataset, taken from D2.5

<p>4 Description</p>	<p>The dataset comprises a collection of zip files sourced from the Cordis dump, containing valuable data in the form of XLSX files related to EU-funded projects. These files have been meticulously curated and extracted from multiple sources, including the Cordis FP7 projects (https://data.europa.eu/data/datasets/cordisfp7projects?locale=en), Cordis H2020 projects (https://data.europa.eu/data/datasets/cordish2020projects?locale=en), and Cordis EU Research Projects under Horizon Europe 2021-2027 (https://data.europa.eu/data/datasets/cordis-eu-research-projects-under-horizon-europe-2021-2027?locale=en). The dataset encompasses a wealth of information, including details about project consortiums, budget allocations, project publications, and other pertinent data points essential for comprehensive analysis and research into European Union-funded projects. Researchers and analysts will find this dataset to be a valuable resource for gaining insights into the intricacies of EU-funded endeavours and their associated financial and publication aspects.</p>
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It could be interesting to see how many project consortia have been led by social origin (country), how many men and women (sex) participated, how many project publications have been led by English native speaking scientists (race or social origin), etc.

This information could give additional valuable insights for funders to impact in future projects, such as an obligation for project consortia i.e., to include more widening countries (Bulgaria, Croatia, Cyprus, Czechia, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia and Slovenia).

Another example is Table 3 Metadata of HFRI Funded Projects’ Portfolio (page 14 of D2.5).

Figure 5. Table 3 Metadata of HFRI Funded Projects’ Portfolio, taken from D2.5

<p>4 Description</p>	<p>The dataset consists of:</p> <p>(1) HFRI funded research projects from the HFRI Portal (https://hfri.grnet.gr/), including the name and surname of each PI, the project Host Institution, the Scientific area and field/subfield of the project, the Call in which it was submitted, the project abstract, its keywords, its title, and also its approved budget and duration (all in EXCEL)</p> <p>(2) the calls for proposals and</p> <p>(3) a file with the corresponding acknowledgement text.</p>
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In this case, the inclusion of the sex of the PI could give additional information to the Hellenic Foundation for Research & Innovation (HFRI) to better understand who is scientifically leading their funded scientific projects. **The sex-disaggregation of the available data has been realized in tables 7 – 27**, which is an excellent approach.

This additional information might have an impact on the research outputs and research environment of the HFRI funded projects.

As way of example for what is meant by research output, this report would like to highlight the paragraph on **research objects** of the ELSI Analysis dated 29 June 2023: *“To make matters worse, it is generally difficult for women in innovation and research to find funders and investors to carry out their research projects or start innovative companies (Hassan et al., 2020). On the one hand, this may be due to the “pitch”, i.e. the short application speech, and the way women present their projects. Another cause may be the content of the projects, which often have a rather social character and are considered unsuitable by the mostly male investors.”*

If the HFRI obtained more information on the sex of the PI of their funded projects and they hypothetically found out that it was more men than women scientists who lead the funded projects, HFRI could then influence in this imbalance and try to support more women lead scientific projects. This would then enrich the scientific outputs, especially for half of Greek population, namely women.

As an example for the impact on the research environment, the following paragraphs on **scientific cooperation** in the ELSI Analysis dated 29 June 2023, state:

“(…) women’s participation in research groups has a positive impact on collaboration, and provides evidence for this in Bear and Woolley (2011). As women continue to be underrepresented in STEM subjects and scientific innovation increasingly comes from team collaborations, Bear and Wolley (2011) reviewed the existing literature on the impact of gender diversity on team processes and performance. Recent evidence strongly suggests that team collaboration is greatly enhanced by the presence of women in the group, and this effect is mainly explained by benefits to group processes. The evidence regarding the impact of gender diversity on team performance is ambiguous and depends on a variety of contextual factors. Given the importance of collaboration in science, promoting the role of women in this area can have positive practical consequences for science and technology.

(...) a competitive environment has a negative impact on female scientists, based on the research of Anderson et al (2007). (...).

(...) there is a difference in perception between female scientists and their male colleagues regarding their own contributions in group work: Scientists value their own contribution more highly than that of their female colleagues."

It can be hypothetically assumed that there might be a difference in leadership styles of a male or female PI. If there are more male PI than female PI, then it might be more difficult to create a **diverse** research culture (the same would happen if there are proportionally more projects led by women than by men). That's why information on the sex of the PI could impact the HFRI to influence on the underrepresented sex of the leadership of the projects that they want to fund.

Detailed recommendations on the datasets mentioned in D2.5

In the following, this report gives further recommendations on the disaggregated data on anti-discrimination which could be added to the IntelComp Catalogue **as additional information** only if the dataset providers are able to provide this information.

- It is recommended to include disaggregated data on anti-discrimination in tables 28, 29, 30. The reasoning for tables 2 and 3 above is also valid for tables 28, 29, 30.
- For tables 31 and 32 the following paragraphs on authorship and publications of the ELSI Analysis dated 29 June 2023 state:

"Firstly, there is a gender difference in the acceptance of publications. Far fewer articles would be accepted from women than from men, although they had submitted just as many. (...)

(...) there are differences between the sexes with regard to the first publication, because women usually publish later than men. Rasmussen backs this up with a study by Feldon et al (2017). The authors of this study show that in a national cohort of 336 first-year doctoral students from 53 research institutions in the life sciences (i.e. microbiology, cell biology, molecular biology, developmental biology and genetics), the female participants performed significantly more research hours than their male colleagues (Feldon et al., 2017). In addition, female participants were significantly more likely than male participants to report that they attributed their hours to the demands of their assigned projects during the academic year. Nevertheless, men were 15 per cent more likely to be listed as authors in published journal articles, indicating an unequal relationship between time and effort. Given the cumulative advantage that accrues to students who publish early in their academic careers and the central role that scholarly productivity plays in academic hiring decisions, these findings as a whole point to an important potential cause for the persistent underrepresentation of women on university faculties in these fields (Feldon et al., 2017).

(...) there is a difference in the manner of auto-citation, with female scientists citing themselves less frequently than their male colleagues. She refers here to King et al. (2017). Using novel methods and a dataset of 1.5 million research papers in the JSTOR scholarly database published between 1779 and 2011, the authors find that almost 10 per cent of references in a publication are self-citations by the author. The results also show that men cited their own work 56 per cent more often than women between 1779 and 2011. In the last two decades for which data are

available, men have written 70 per cent more self-citations than women. Women are more than 10 percentage points more likely than men to not cite their own earlier work at all. While these patterns may be due to differences in the number of papers published by men and women rather than gendered patterns of self-citation behaviour, this gender gap in self-citation rates has increased by 14 percentage points over the past 50 years despite the increasing representation of women in academia. King et al. break down the self-citation patterns by academic field and number of authors and explain possible mechanisms behind these observations. These findings have important implications for scientific visibility and cumulative advantage in academic careers (King et al., 2017).

(...) there is a difference in the first and last author inside positions, with women tending not to be in these prestigious positions. She refers to an analysis by West et al. (2013). Their large-scale analysis based on more than eight million publications in the natural sciences, social sciences and humanities reveals a number of inequalities between male and female scientists. Even where the number of publications appears to be equal between the sexes, a closer look reveals that in certain fields men predominate in the prestigious positions of first and last authors. Furthermore, women are significantly underrepresented as authors of papers that have only one author. Researchers should be aware of the subtle ways in which gender inequalities in scientific authorship can occur.”

Therefore, the sex of the first author could be a very valuable information as well as their nationalities (are they from the Global North or Global South (social origin and race), English native speaking (social origin and race), etc.).

- In tables 34 and 35 it would be interesting to know in which country (social origin) the organization and research project are based.
- On page 57 of D2.5 (Research output dataset) it is recommended to also include the sex and social origin and race of the persons (again, only if available for provider).
- On pages 59 and 63 it would be interesting to know from the provider, if the scholarly communication and the project results can also be disaggregated by anti-discrimination criteria (sex, race, colour, ethnic or social origin, genetic features, language, religion or belief, political or any other opinion, membership of a national minority, property, birth, disability, age or sexual orientation).
- For tables 37 -41 and PATSTAT it would be interesting to get confirmation by provider if this dataset can be disaggregated by anti-discrimination criteria.
- For Crunchbase -Organizations it would be interesting to include disaggregated by social origin of the organization (to see if it's Global North organizations only, especially if the coverage is worldwide). For tables 45 and 47 it would be especially interesting to obtain information on the sex of the leader of the organization and the organization's origin (country).
- Regarding all **human resources, health, climate and AI datasets** it's recommended to ask providers for disaggregated datasets by anti-discrimination criteria (sex, race, colour, ethnic or social origin, genetic features, language, religion or belief, political or any other opinion, membership of a national minority, property, birth, disability, age or sexual orientation). Regarding the climate datasets, please, refer to the explanations in chapter on Climate change/blue economy (ELSI Analysis dated 29 June 2023).

These recommendations can be understood as Equity – Diversity – Inclusion (EDI) mainstreaming. Regarding the expression mainstreaming, please, refer to the ELSI Analysis dated 29 June 2023.

2.4.2. Social Media (X)

The latest events on the application “X” (formerly known as “Twitter”) **could reopen a debate amongst IntelComp members on whether or not a European excellent project such as IntelComp should use “X” as a dissemination channel.**

In the following, there are some pros and cons when using “X”:

Pros:

- *Global Reach:* “X” provides a platform for users to connect and share information globally. It allows IntelComp scientists to reach a diverse audience from different parts of the world.
- *Real-Time Updates:* “X” is known for its real-time nature. IntelComp scientists can receive and share updates instantly, making it a valuable tool for staying informed about current events, trends, and breaking news.
- *Networking:* “X” is a powerful networking tool. It allows IntelComp scientists to connect with people who share similar interests, both personally and professionally. This can lead to meaningful collaborations, partnerships, and friendships.
- *Brand Promotion:* For IntelComp scientists, “X” is an effective platform for promotion and marketing of the project. It provides a space for creating awareness, engaging with the audience, and promoting the IntelComp results.
- *Hashtags and Trends:* The use of hashtags allows IntelComp scientists to participate in or follow trends. This can help in increasing visibility and engagement as IntelComp scientists can discover content related to specific topics.

Cons:

- *Misinformation:* Due to the real-time nature of “X”, misinformation can spread quickly. False information may go viral before it can be fact-checked, leading to the potential spread of inaccuracies.
- *Trolling and Harassment:* “X” has faced criticism for not doing enough to combat trolling, harassment, and hate speech. Some users may experience negative interactions, which can affect their mental well-being.
- *Short Attention Span:* The fast-paced nature of “X” can contribute to a short attention span. Users may scroll through tweets quickly, leading to a challenge for content creators to capture and maintain audience attention.
- *Privacy Concerns:* Users may face privacy issues, especially if they share personal information on the platform. There have been instances of data breaches and concerns about how user data is handled.

Only on 27 November 2023, Paris Mayor Anne Hidalgo announced she was quitting the “X” application, calling it a "gigantic global sewer" that was "destroying our democracies" by spreading abuse and misinformation (Reuters, 2023).

2.4.3. Environmental issues related to size of data

According to D8.5. “Data Management Plan – final version” the size of the data is around 7.5 Terabytes (TB). From an external perspective it’s difficult to know if this is much data or not.

In the following, there shall be some discussion to reduce the energy footprint when working with a lot of data (if not for this project, eventually for follow-up projects in the future).

This is especially relevant for the data itself (similar to the data minimalization principle of the GDPR: is the data really necessary, is it repeated, is there information which is not needed, etc.), which is obviously not the case for IntelComp. However, it could be relevant for backups. When dealing with backups for a substantial amount of data like 7.5 TB, it's important to optimize energy consumption to ensure efficiency and cost-effectiveness.

Here are some suggestions for low energy consumption during backups (given by IT expert and MIK researcher Óscar Fernandez on 11 December 2023):

- Use Energy-Efficient Hardware:
 - Invest in energy-efficient servers, storage devices, and networking equipment.
 - Opt for hardware that meets industry standards for energy efficiency.
- Implement Incremental Backups:
 - Perform incremental backups rather than full backups whenever possible.
 - Incremental backups only copy the data that has changed since the last backup, reducing the overall workload and energy consumption.
- Backup during Off-Peak Hours:
 - Schedule backups during off-peak hours when the energy grid is under less strain. This can help take advantage of lower electricity costs during non-peak times.
- Utilize Deduplication and Compression:
 - Use data deduplication and compression techniques to reduce the amount of data that needs to be transferred and stored.
 - This can result in lower energy consumption during the backup process.
- Optimize Network Bandwidth:
 - Manage and optimize network bandwidth to avoid unnecessary data transfer.
 - Prioritize critical data and schedule less time-sensitive backups for periods of lower network activity.
- Deploy Energy-Saving Software:
 - Choose backup software that includes energy-saving features.
 - Some software solutions allow you to configure energy-efficient settings or schedule backups during low-demand periods.
- Consider Cloud Backup Solutions:
 - Cloud backup services often have data centers with energy-efficient infrastructure.
 - By offloading backups to the cloud, you may leverage the provider's optimized systems.

- Implement Wake-on-LAN (WoL):
 - If applicable, use Wake-on-LAN to wake up devices only when needed for backup processes. This can be effective in reducing energy consumption during idle periods.
- Monitor and Optimize Power Usage:
 - Regularly monitor power consumption using monitoring tools.
 - Adjust power settings on servers and storage devices to optimize energy usage without compromising performance.
- Implement Power Management Policies:
 - Configure power management policies on servers and backup systems to automatically enter low-power states during periods of inactivity.
- Regularly Update Software and Firmware:
 - Keep backup software and hardware firmware up to date to take advantage of energy-saving improvements provided by manufacturers.
- Energy-Efficient Cooling Systems:
 - Ensure that the data center or storage room has an energy-efficient cooling system in place to maintain optimal temperatures without unnecessary power consumption.

By adopting these strategies, the IntelComp consortium might be able to significantly reduce the energy footprint associated with large-scale backups while maintaining a reliable and efficient backup process for the 7.5 TB of data.

2.4.4. Ethical or legal issues that can impact sharing the data?

According to the document D8.5. “Data Management Plan – final version” there are some ethical issues with data sharing, however, an Ethics Manager ensures compliance with legal and ethical standards, particularly balancing openness with necessary restrictions for certain datasets (see points 3.1.2.1 and 6.1.1 on pages 10 and 13 of D8.5).

However, this is not the case for further ethics issues raised in point 6.1.1 “Are there any ethical or legal issues that can have an impact on data sharing?” on pages 42 and 43, 47, 52, 57, 62, 67, 72 of the Data Management Plan (DMP). That’s why it is recommended to address a mitigation or control for these risks. A control could be the supervision by Ethics Manager (such as realized concerning points 3.1.2.1 and 6.1.1 on pages 10 and 13 of the DMP) and/or explanation and justification why it is only for internal use.

2.4.5. Recommendations

Related to OTHER ETHICS ISSUES it is recommended:

- to include disaggregated data on anti-discrimination in the dataset in the IntelComp Catalogue, only and if the dataset owners/providers are able to provide this information.
- to open a debate amongst IntelComp members on whether or not to use the platform “X” (formerly known as “Twitter”) as dissemination channel.
- to check if energy consumption in case of backup for a substantial amount of data like 7.5 TB can be optimized to ensure efficiency and cost-effectiveness.
- to mitigate risks of ethics issues raised in point 6.1.1 “Are there any ethical or legal issues that can have an impact on data sharing? == YES” with respect to the following datasets in

the DMP: EU-GR Energy & Agrifood ESG Analytics; EU-GR Energy & Agrifood Regulations Set; EU Energy & Agrifood Enriched Patent Set; Topic model of Semantic Scholar documents in the domain of Artificial Intelligence; SciNoBo classified scientific publications (AI & Energy domains); EU-GR Green Skills Dataset; EU-GR Energy & Agrifood Industry Analytics. This can be done by including supervision of Ethics Manager and/or explanation and justification why the data is kept internal and only for internal use.

2.5. Conclusion

The update of the ELSI report dated 29 June 2023 has the following suggestions to the IntelComp Consortium:

Recommendation on the ethics issue ARTIFICIAL INTELLIGENCE:

- If the decision of the IntelComp Consortium is based on the conclusion, that “bias issues raised by the analysis (dated 29 June 2023) are not an issue for IntelComp as the consortium is not working with individual data”, then this updated report dated 15 December 2023 recommends to reconsider the Consortium’s decision, basing their final decision on the 10 items mentioned in the updated ELSI Analysis.

Recommendations on OTHER ETHICS ISSUES:

- It is recommended to include disaggregated data on anti-discrimination in the datasets in the IntelComp Catalogue, only and if the dataset owners/providers are able to provide this information.
- It is recommended to open a debate amongst IntelComp members on whether or not to use the platform “X” (formerly known as “Twitter”) as dissemination channel.
- It is recommended to check if energy consumption in case of backup for a substantial amount of data like 7.5 TB can be optimized to ensure efficiency and cost-effectiveness.
- It is recommended to mitigate risks of ethics issues raised in point 6.1.1 “Are there any ethical or legal issues that can have an impact on data sharing? == YES” with respect to the following datasets in the DMP: EU-GR Energy & Agrifood ESG Analytics; EU-GR Energy & Agrifood Regulations Set; EU Energy & Agrifood Enriched Patent Set; Topic model of Semantic Scholar documents in the domain of Artificial Intelligence; SciNoBo classified scientific publications (AI & Energy domains); EU-GR Green Skills Dataset; EU-GR Energy & Agrifood Industry Analytics. This can be done by including supervision of Ethics Manager and/or explanation and justification why the data is kept internal and only for internal use.

2.6. References:

Reuters (2023), Paris mayor quits X, calling social media site a ‘gigantic global sewer’, in Reuters, 27.11.2023. Retrieved on 12.12.2023 from: <https://www.reuters.com/world/europe/paris-mayor-quits-x-platform-calling-it-gigantic-global-sewer-2023-11-27/>.

UN Women (2021), Counted and Visible: Toolkit to better utilize existing data from household surveys to generate disaggregated gender statistics. Retrieved on 12.12.2023 from

https://unstats.un.org/unsd/statcom/52nd-session/documents/BG-3I-Executive_Summary_Counted_and_Visible_Toolkit-E.pdf, page 4.

ANNEX 1: COMMENTS BY THE CONSORTIUM

Concerning Recommendation on the ethics issue ARTIFICIAL INTELLIGENCE

The content proposed for the external audit applies to every project and system using data and AI algorithms, given the known risks of these systems. There's not a specific item for the IntelComp platform.

The recommendation of an external audit of the AI tools to be done one year after its use depends on the IntelComp Sustainability Plan and whether the partners agree to keep everything online running for one year at least. Partners exploiting the AI tools should take this recommendation into account in the future.

Concerning Other Ethics Issues -> IntelComp Catalogue

In the Data Catalogue, all the criteria for every artifact (dataset or tool) can be seen if the artifact is selected. For every dataset, external users can see the description, subjects, type, format, webpage and source. For every tool, external users can see the description and the technical information (subjects, type, format, version and publication year).

Concerning Recommendation on Other Ethics Issues -> Include disaggregated data on anti-discrimination in the datasets in the IntelComp Catalogue

The dataset owners/providers cannot provide this information.

Concerning Recommendation on Other Ethics Issues -> Energy consumption

The size of the data in the IntelComp Dataspace is very small with respect to the dataspace of science, technology, and innovation activities. The Barcelona Supercomputing Center maintains a reliable and efficient backup process for the 7.5 TB of data.

Concerning Recommendation on Other Ethics Issues -> data sharing of datasets in the DMP

The consortium has distributed the datasets that the project has created, but do not redistribute raw data from third parties, or indicators calculated from data where it was unclear whether publication of this aggregations is permitted or not.