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Privacy preserving federated machine learning and blockchaining for reduced cyber risks in a world of distributed healthcare



Deliverable 1.2
“Gender action report”

Work Package 1
“Coordination and Management”

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1 Table of acronyms and definitions

concentris	concentris research management gmbh
D	Deliverable
DoA	Description of Action
EC	European Commission
GA	General Assembly
GAP	Gender Action Plan
GND	Gnome Design SRL / Egnosis
H2020	Horizon 2020
IIB	Impact and Innovation Board
IP	Intellectual Property
MS	Milestone
MUG	Medizinische Universität Graz
n.a.	not applicable
Patients	In this deliverable, we use the term “patients” for all research subjects. In FeatureCloud, we will focus on patients, as this is already the most vulnerable case scenario and this is where most primary data is available to us. Admittedly, some research subjects participate in clinical trials but not as patients but as healthy individuals, usually on a voluntary basis and are therefore not dependent on the physicians who care for them. Thus to increase readability, we simply refer to them as “patients”.
R&I	Research and Innovation
RI	Research Institute AG & Co. KG
RP	Reporting Period
SAB	Scientific Advisory Board
SBA	SBA Research Gemeinnützige GmbH
SC	Steering Committee
SDU	Syddansk Universitet
UHAM	University of Hamburg
UMR	Philipps Universität Marburg
WP	Work package

1 Objectives of the deliverable based on the Description of Action (DoA)

- WP1: Coordination and Management
- WP1, Objective 6: To foster gender parity in this very male dominated scientific field
- WP1, Task 5: Gender monitoring (UHAM, concentris)

Original Text from the DoA, Part B3.3: “Gender equity ambitions within FeatureCloud”

“FeatureCloud is committed to a work environment that promotes equal opportunities across gender and prohibits discriminatory activities. To this end, the institutions of all partners in the consortium have taken measures to improve the under-representation of women in science and the gender inequalities that persist from hiring to advancing to higher career levels. Especially the latter is highly relevant, as the academic pipeline from junior to senior faculty leaks female scientists: despite there being more female than male undergraduate students in many countries, a large gender disparity remains at the professorial level. In FeatureCloud we therefore strive to create an environment that supports gender parity also at senior levels. Since at the start of the project, gender parity within the consortium is not yet achieved, a gender action plan will be created at month 3 (D1.1). This plan will detail a strategy for how to enrol more female (senior) scientists to the project. Its implementation will be monitored and reported at the end of the project (D1.2). In FeatureCloud we will further promote equal career opportunities by providing (a) a mentoring programme that incorporates elements designed specifically to support female early career researchers (WP9); (b) by ensuring that working hour arrangements for staff employed will not disproportionately disadvantage those with caring responsibilities; and (c) by the PMO regularly monitoring gender issues from hiring to career opportunities and retention of staff.”

2 Executive Summary

This Deliverable report (D1.2) presents the results of how the consortium followed our initial Gender Action Plan (GAP) for the FeatureCloud project (see D1.1). The purpose of the GAP was to address the requirements for gender equality in the European Union’s Horizon 2020 (H2020) framework programme. In H2020, the promotion of gender equality, including the integration of the gender dimension in research and innovation content, is enshrined in the three core documents:

- The Horizon 2020 Regulation
- The Rules for Participation
- The Specific Programme implementing Horizon 2020

By signing the Grant Agreement, all FeatureCloud participants have committed to promoting equal opportunities and a balanced participation of women and men at all levels in research and innovation teams and in management structures (H2020 General Model Grant Agreement, Article 33.1. Obligation to aim for gender equality:

“The beneficiary must take all measures to promote equal opportunities between men and women in the implementation of the action. It must aim, to the extent possible, for a gender balance at all levels of personnel assigned to the action, including at supervisory and managerial level.”

Of course (and despite the simplification into the two genders “male” and “female”), this commitment also included the equal treatment and welcoming of minorities, e.g. diverse, gender-fluent, or openly lesbian/gay/bi/transgender/queer (LGBTQ) job applicants and employees, within the FeatureCloud workforce. Overall, the FeatureCloud consortium always strove for a very open-minded, welcoming, and socially liberal

Three objectives underpin the strategy on gender equality in Horizon 2020 and were taken into account by the FeatureCloud consortium and the GAP:

- Fostering gender balance in research teams to close the gaps in the participation of women
- Ensuring gender balance in decision-making (e.g., in the [Impact and Innovation Board, IIB](#))
- Integrating the gender dimension in research and innovation (R&I) content

3 Deliverable report

3.1 Challenge

When the project started, computer science was still a very male-dominated field. In 2018, for example, the number of male authors in the collection of computer science publications was about 475,000 compared with 175,000 women (see [Metz C. 2019](#), and [Wang et al. 2021](#)). FeatureCloud was therefore committed to creating a work environment that promoted equal opportunities across all genders (male/female/diverse) and prohibited any discriminatory activities. To this end, the institutions of all partners in the consortium have taken measures to improve the under-representation of women in science, especially in the field of computer science, IT engineering, and programming. The challenge was to reduce the gender inequalities that persist at all levels, from hiring to advancing to higher career levels (commonly referred to as hitting the “glass ceiling”). Especially the latter is highly relevant as the academic pipeline from junior to senior faculty leaks female scientists: despite there being more female than male undergraduate students in many countries and research fields, a large gender disparity remains at the professorial level (**Figure 1**). In FeatureCloud, we were therefore committed to creating a team spirit and work environment that supported gender parity in all steps and throughout all levels, from undergraduate and doctorate students, over postdocs, all the way to junior professorships.

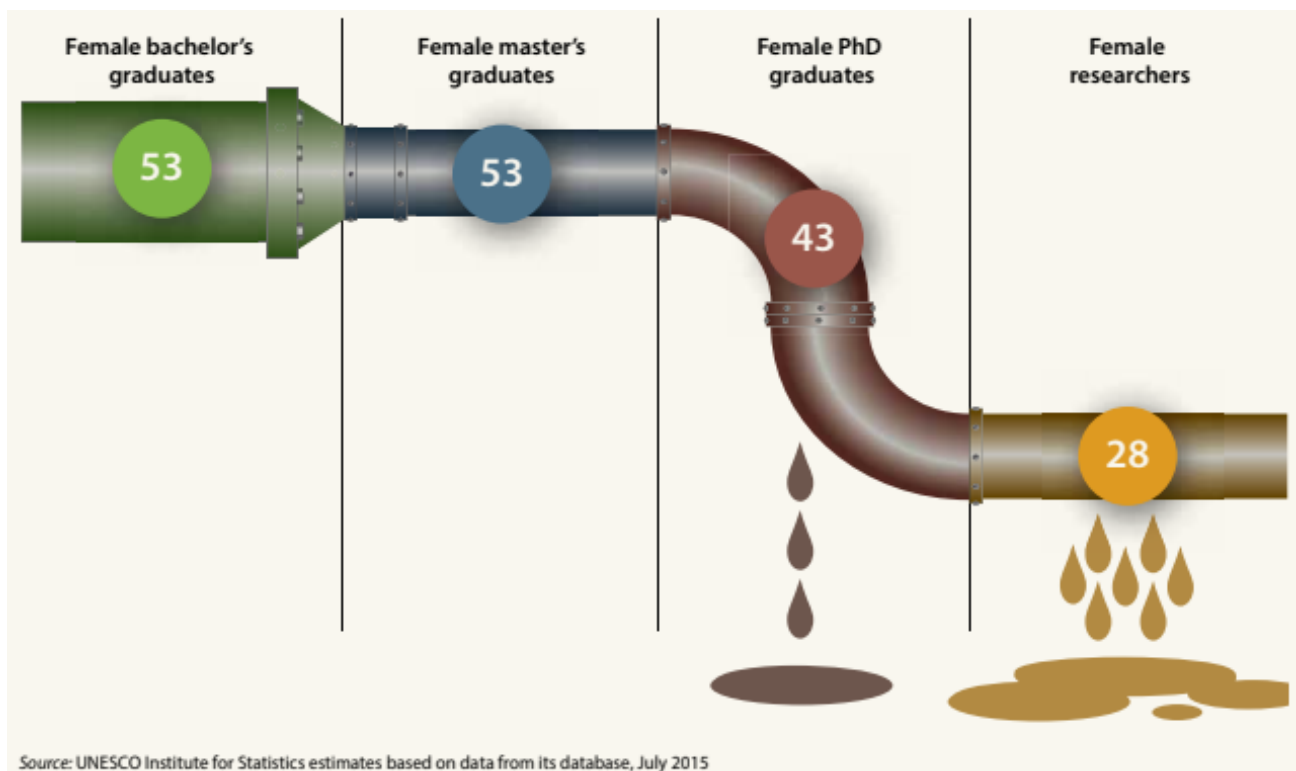


Figure 1. The leaky pipeline (source: [UNESCO Science Report, 2015](#)) displays the share of women in higher education and research from the time they receive their Bachelor's degree to the time they graduate with a Master's degree, receive their PhDs, and remain or drop out of research.

3.2. Methodology

FeatureCloud's initial GAP (D1.1) detailed a strategy for how to support junior female scientists in their research career and for how to increase the number of female professionals in the FeatureCloud project. The implementation of the GAP was monitored throughout the lifetime of the project and adapted to the needs of each situation. D1.1 proposed the following action measures to address potential disadvantage where appropriate and to mainstream gender equity and equality into scientific institutions, policies, and practices. In FeatureCloud, we promoted equal career opportunities by providing:

1. A **mentoring programme** that incorporated elements designed specifically to support female early career researchers (MS49 - Mentor-mentee scheme established, which was chieved in project month 12), not excluding or stigmatising male early career researchers, but demonstrating the importance and opportunities of an equally distributed gender environment
2. **PMO-directed monitoring of gender issues**, from hiring to career opportunities and retention of qualified personnel in the project
3. A **fair process of hiring and administrative help** (at individual partner institutions) for families and single mothers in order to be more attractive for female researchers (e.g. day-care facilities or an equal amount of parental leave after childbirth for both mother and father)
4. **Flexible work hours**

3.2.1 Mentoring programme

Despite a record number of women with university degrees, the data still point to a "leaking pipeline" especially in science, technology, engineering and mathematic (STEM) fields - with a large gap between the number of women starting their scientific careers and the number of women advancing to senior positions. One of the many ways we can help to close this pipeline is through mentoring. In practical terms, this meant actively helping female FeatureCloud researchers to advance into higher academic positions and to actively support women's careers, in particular, to provide advice and support at key decision points in life (e.g. before a planned pregnancy or during a planned or unplanned pregnancy). To achieve this this goal, FeatureCloud established a mentor-mentee scheme until the end of the first project year (31/12/2019), and created pairs of mentors (senior scientists) and mentees (junior scientists). A special focus was put on the coaching and mentoring of young female scientists in FeatureCloud. Mentors and mentees met about four times per year (once a year face-to-face, usually during the annual General Assembly (GA) Meetings) to discuss the young scientist's research portfolio, ambitions, and for advice and discussion of topics arising.

3.2.2 Gender balance in project management and planning

As part of the detailed gender-neutral work plan of the individuals involved in FeatureCloud, we have actively included women in the technical performance of the project WPs and tasks. During the application phase of the grant proposal, **before the project start, the percentage of female employees was at 23%** (5 of 22), see **Table 1** for reference. Frequent gender monitoring will be conducted, for example during the periodic reporting times, to identify and monitor the gender balance. This monitoring task was the responsibility of the coordinator, Jan Baumbach, and the PMO (TUM, UHAM, and concentris) and results were taken into account for subsequent project management, hiring, and planning. Initially, female researchers leaving the project was considered a major risk. This risk was mitigated by a) welcoming women into the workforce, b) retaining women in the workforce, and c) by other women taking up their roles (e.g. in the case of concentris' project managers Andrea Wohner and Miriam Simon, who both left the project, but were replaced by Nina Donner during reporting period 4 (RP4). The FeatureCloud Steering Committee (SC) also encouraged this three-fold principle wherever applicable and feasible.

3.2.3 Gender balance reporting

Now, at the end of the FeatureCloud project, this report shows the status of the employment of female researchers in the project in terms of male/female staff numbers and with regard to the nature and level of the tasks undertaken. This report lists 11 results (see chapters 3.3.1 - 3.3.11), including:

- The nature and level of the tasks undertaken
- Project-wide employment of women throughout FeatureCloud and across the consortium
- Scientific / research productivity of women throughout this project in terms of participation of women in scientific contributions.

When we evaluated (via face-a-face, personal conversations, mentoring discussions, and in the final video-interview series) what further career steps the female scientists of FeatureCloud may have in mind and to what extent it is possible for them to pursue a subsequent scientific career, almost none of the current female workforce employees mentioned thinking about leaving their careers or moving into a completely unrelated field of research. While we did not perform a formal qualitative or quantitative survey of their future career plans (information which they may not have felt comfortable sharing with the PMO, even in an “anonymised” setting), we are confident that most if not all of them remain enthusiastic about their work and will continue to follow their current career paths.

3.2.4 Administrative help for families and single mothers

In order to remain attractive for job seeker, researchers often not only consider the job itself, but also the surroundings regarding the support network, facilities, flexible work hours, and administrative help for families and single mothers. Thus, individual partner institutions offered various advantages, for example family services, flexible work hours, or equal parental leave time for both mothers and fathers following childbirth. Such services actively help with the organisation and a healthy alignment of childcare and career.

3.3 Results

3.3.1 Consortium gender status before and at the beginning of the project

Gender parity within the consortium could not be achieved during the application process (**Table 1**) and before the recruitment of new staff.

FeatureCloud Partner No / Partner Name	Females	Males
01 TUM	0	3
02 UMR	0	1
03 MUG	0	3
04 SDU	0	1
05 SBA	0	2
06 UM	0	2
07 concentris	4	0
08 RI	0	4
09 GND	1	1
TOTAL	5	17

Table 1: Gender distribution of partner employees before the beginning of the project.

Therefore, during the recruitment process (December 2018 – March 2019), all partners placed particular emphasis on hiring an equal number of female and male scientists. By March 2019, eight female scientists could be newly employed to work on the FeatureCloud project (see **Table 2**).

FeatureCloud Partner No / Partner Name	Newly hired females	Newly hired males
01 TUM	3	1
02 UMR	1	0
03 MUG	1	0
04 SDU	1	1
05 SBA	<i>No change in personnel</i>	
06 UM	0	2
07 concentris	<i>No change in personnel</i>	
08 RI	<i>No change in personnel</i>	
09 GND	0	2
TOTAL	6	6

Table 2: Gender distribution of newly hired employees working on FeatureCloud as of March 2019.

3.3.2 Gender balance in our independent Scientific Advisory Board (SAB)

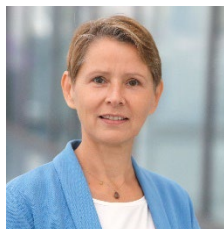
Furthermore, the FeatureCloud consortium has attached great importance to including female senior researchers in the Scientific Advisory Board (SAB). Of the **eight SAB members, four were female professors or leaders in industry** who have an outstanding expertise in their field of research:



Professor Dr **Yana Bromberg**, Department of Genetics, Biochemistry and Microbiology, Rutgers University, New Brunswick, NJ, USA



Professor Dr **Iris Eisenberger**, Institute of Law, University of Graz, Graz, Austria



Mag. **Maria Kirschner**, MSc, Managing Director, Kyndryl Austria GmbH, Austria



Dr med. **Enise Lauterbach**, Founder, LEMOA medical, Trier, Germany

We observed that their presence at the project’s General Assembly (GA) Meetings, their encouraging feedback to students and young professionals, as well as their invited and welcome critique and constructive criticism throughout the duration of the project clearly exerted a “role model and mentoring function” - inspiring and supporting the younger generation of female researchers and professionals within the FeatureCloud consortium. For this, their enthusiasm about the project, and their valuable feedback, we are very grateful.

3.3.3 Gender balance in FeatureCloud’s Impact and Innovation Board (IIB)

The IIB was composed of three men and **four women**:

- 01 UHAM: Jan Baumbach (IIB Chair)
- 01 UHAM: **Christina Saak** (IIB Member and Note Taker)
- 03 MUG: **Alessa Angerschmid** (IIB Member)
- 03 MUG: **Anna Saranti** (IIB Member)
- 05 SBA: **Anastassiya Pustozero** (IIB Member)
- 08 RI: Christof Tschohl (IIB Member)
- 09 GND: Béla Bihari (Co-Chair)

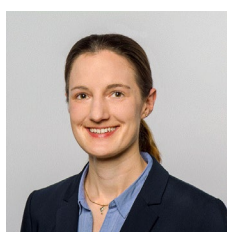
Throughout the project’s duration, the IIB – with the support of WP9 leader concentris – oversaw and evaluated the impact of the FeatureCloud’s dissemination activities, monitored and evaluated the emergence of newly generated intellectual property (IP) from the consortium’s research activities, regularly checked the dissemination tracker regarding the status of manuscripts, and also ensured the consortium’s adherence to the internal publication rules (laid out in the Consortium Agreement), the correct use of the European Commission’s (EC) funding acknowledgement, and compliance with the open access policy of the EC.

3.3.4 Gender distribution within FeatureCloud’s project management office (PMO)

Although the PMO did not make any decisions on its own, it played a key role in drafting, communicating, and preparing necessary decisions for the project’s decision-making bodies, e.g. the SC (WP leaders) or the GA (entire consortium). Throughout the final reporting period (RP4), the PMO consisted of one man (project coordinator) and **three women**, which signifies an advancement of females to higher-level positions in the areas of science management, project management, project controlling, and also science communication and dissemination (in the case of Nina Donner from partner concentris). The three women performed FeatureCloud’s day-to-day managerial and communication tasks while Jan Baumbach focused on the “big-picture” scientific coordination of FeatureCloud, quick and effective solution-seeking whenever technical problems arose, and on networking with the scientific community and other important stakeholders:

- 01 UHAM: Jan Baumbach (FeatureCloud project coordinator)
- 01 UHAM: **Christina Saak** (science manager in Jan Baumbach’s group)
- 01 UHAM: **Nina Wenke** (science manager in Jan Baumbach’s group)
- 07 concentris: **Nina Donner** (FeatureCloud project manager and WP9 leader)

Previous project managers were **Andrea Wohner** and **Miriam Simon** (also females, working at partner concentris - *at that time).



Nina Wenke



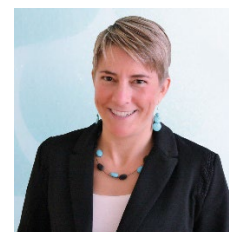
Christina Saak



Andrea Wohner



Miriam Simon*



Nina Donner

3.3.5 Status of the consortium as a whole at the end of the project (December 2023)

By the end of the project's lifetime, **38.4% of the people working on FeatureCloud were women** and 61.6% men (please see **Figure 2** and – if you are an EC project officer or expert reviewer, meaning you have access to the confidential reporting documents of the project – please view the 'Gender Table' of the 4th and final periodic report for reference). In detail, 33 females and 53 males were reported to work on the project when concentris collected the gender information from each partner during the final reporting. There was, however, still a persistent gender gap between the number of females working on technical and scientific tasks (**24.5%**) compared to the number of females working on administrative, managerial, and organisational tasks (**60.6%**):

- **13 female and 40 male partner employees** (incl. PIs / professors, postdocs, and PhD students) worked on technical and scientific tasks of the FeatureCloud project during RP4.
- **20 female and 13 male partner employees** were involved in other FeatureCloud tasks (e.g. management, meeting organisation, budget controlling, book-keeping) during RP4.



Figure 2. At the end of the project, the percentage of females working on FeatureCloud amounted to 38.4%. Within the Scientific Advisory Board (SAB) the percentage of women was always exactly 50% throughout the duration of the project. The visual above (taken from the related [social media post](#) on FeatureCloud's LinkedIn account) shows both our female consortium members as well as our female SAB members at FeatureCloud's 6th and Final GA Meeting in Lisbon, Portugal 12-15 November 2023. From left to right: Regina Puga-Hertzsch (concentris), Nina Karguth (concentris), Christina Saak (UHAM), Daryna Oliynyk (SBA), Olga Zolotareva (UHAM), Nina Donner (concentris), Maria Kirschner (SAB member), Jennifer Jenssen (SDU), Monika Moga (GND), Tanja Šarčević (SBA), Anna Saranti (MUG), Enise Lauterbach (SAB member), Sandra Clemens (UMR), and Anastassiya Pustozero (SBA).

Table 3 below shows the gender distribution for each beneficiary within reporting period 4 (RP4), which is exemplary for all other reporting periods. For interpreting the table correctly, please note that many (but not all) of the employees listed in the two columns on the right side (“workforce other than researchers”) did not permanently working on FeatureCloud, but were merely active before each of the four periodic reports were submitted to the funding agency (every 12 to 18 months).

Beneficiary	Number of female researchers* (all levels, incl. postdocs and PhD students) involved in the project	Number of male researchers* (all levels, incl. postdocs and PhD students) involved in the project	Number of female in the workforce other than researchers involved in the project	Number of male in the workforce other than researchers involved in the project
01 UHAM	3	11	2	0
02 UMR	1	1	1	1
03 MUG	2	7	2	0
04 SDU	1	5	2	1
05 SBA	4	9	1	0
07 concentris	<i>n.a.*</i>	<i>n.a.</i>	7	2
08 RI	2	7	4	4
09 GND	<i>n.a.</i>	<i>n.a.</i>	1	5
Total	13	40	20	13

Table 3. Number of female and male employees working on FeatureCloud during RP4.

**n.a.* = not applicable

3.3.6 Overall Commitment to implementing the Gender Action Plan

The FeatureCloud consortium remained committed to offer all, and especially female employees, an environment in which it is possible to balance private and professional lives. In this context, all our university partners offered special family service for employees at their site. The consortium encouraged female researchers to strive for higher career paths within the FeatureCloud project, but was also supporting them regarding careers beyond the project. From the very beginning, the FeatureCloud consortium has been focusing on retaining female talent and supporting them in their careers. During the hiring process, partners placed particular emphasis on a fair hiring process ensuring female scientists have equal access to opportunities within the consortium.

Continued active support of gender equity beyond the project duration: The FeatureCloud consortium also remains committed to pursue gender equity efforts in order to achieve true gender equality in both the scientific workforce as well as in research data.

3.3.7 Promoting gender balance in all teams at all levels

The project participants recognised and fully supported the threefold relationship between women and research, as described by the European Commission, in that women’s participation must be encouraged 1) throughout the course of the project as well as 2) in the evaluation and consultation process. They also realised and accepted that 3) research must address women’s needs equally to men’s needs, and that research should contribute to an enhanced understanding of gender issues.

A statement on Equality, Diversity and Inclusion can also be found on the 'Members' page of the FeatureCloud website: "*FeatureCloud is committed to fostering gender balance in research teams, ensuring gender balance in decision-making, and integrating the gender dimension in research and innovation*".



While gender balance at the level of the WP leaders was not achievable because the WP leaders had mainly been defined at the beginning of the project (only change: WP8 leadership was ultimately transferred from partner UM to partner RI after UM left the consortium), we had women working at all other levels, from undergraduate students to PhD candidates and postdocs.

We would also like to highlight that UMR's team leader and FeatureCloud WP3 leader, Prof. Dominik Heider (see profile picture on the left) was awarded UMR's 'Award for Supporting Women' in 2020 ('*Frauenförderpreis*' in German).

3.3.8 Female role model of FeatureCloud

A remarkable role model has been [Anne-Christin Hauschild](#) (see profile picture on the right) who received multiple awards and fellowships and was a postdoctoral researcher at the Center for Addiction and Mental Health (CAMH) in Toronto, Ontario, Canada, before starting to work on the FeatureCloud project as the Head of the Medical Informatics Division (at partner UMR) together with team leader Prof. Dominik Heider. Since 2021, she has advanced her career by accepting a Junior Professorship in the Institut of Medical Informatics at the University of Göttingen. Her ambition, excellence, success, and mentoring of younger females in the FeatureCloud consortium has greatly contributed to retaining female talent in the project's workforce and to motivate young females to enter a career in computer science.



3.3.9 First-author publications by female consortium members

As of 31st December 2023, FeatureCloud resulted in **71 scientific publications** (plus 4 summaries of periodic reports), including original research articles, review papers, conference publications, and dissertations. We here list the **33 publications that were first-authored by female consortium members** throughout the duration of the project, meaning almost half of all FeatureCloud publications!

- Brauneck A et al. (2023). **Federated Machine Learning, Privacy-Enhancing Technologies, and Data Protection Laws in Medical Research: Scoping Review**. *Journal of Medical Internet Research* (25), Article: e41588 (PDF | 1.0 MB)
- Brauneck A, Schmalhorst L, and Kazemi Majdabadi MM (2023). **Federated machine learning in data-protection-compliant research**. *Nature Machine Intelligence*, 5: pp. 2–4 (Green Open Access PDF-token)
- Hartebrodt A and Röttger R (2023). **Privacy of federated QR decomposition using additive secure multiparty computation**. *IEEE Transactions on Information Forensics and Security*, Article: 10207753 (PDF | 532 kb)
- Hartebrodt A, Röttger R, and Blumenthal DB (2022). **Federated singular value decomposition for high-dimensional data**. *Data Mining and Knowledge Discovery*. DOI: 10.1007/s10618-023-00983-z (PDF | 3 MB)

- Lederer I, Mayer R, and Rauber A (2023). **Identifying Appropriate Intellectual Property Protection Mechanisms for Machine Learning Models: A Systematization of Watermarking, Fingerprinting, Model Access, and Attacks.** *IEEE Transactions on Neural Networks and Learning Systems*, Article: 10143370 (PDF | 2.0 MB)
- Oliynyk D, Mayer R, and Rauber A (2023). **I know what you trained last summer: A Survey on Stealing Machine Learning Models and Defences.** *ACM Computing Surveys*, 55 (14s), Article No.: 324 (PDF | 1 MB)
- Pustozero A, Baumbach J, and Mayer R (2023). **Analysing Utility Loss in Federated Learning with Differential Privacy.** *Proceedings of the 22nd International Conference on Trust, Security, and Privacy in Computing and Communications (TrustCom)* in Exeter, United Kingdom (PDF | 1 MB)
- Pustozero A, Baumbach J, and Mayer R (2023). **Differentially Private Federated Learning: Privacy and Utility Analysis of Output Perturbation and DP-SGD.** *Proceedings of the 2023 IEEE International Conference on Big Data (BigData)*, Sorrento, Italy: pp. 5549-5558 (PDF | 2 MB)
- Sakhnovych Y, Röttger R, and Mayer R (2023). **A Comparison of Federated Aggregation Strategies and Architectures for Next-word Prediction.** *Proceedings of the 2023 IEEE International Conference on Big Data (BigData)*, Sorrento, Italy: pp. 5569-5577 (PDF | 463 kb)
- Šarčević T., Mayer R, and Adler P (2023). **Achieving Privacy and Tracing Unauthorised Usage: Anonymisation-based Fingerprinting of Private Data.** *Proceedings of the 2023 IEEE International Conference on Big Data, (BigData)*, Sorrento, Italy: pp. 5578-5587 (PDF | 462 kb)
- Bernett J et al. (2022). **Robust disease module mining via enumeration of diverse prize-collecting Steiner trees.** *Bioinformatics* 38(6): pp. 1600–1606 (PDF | 1 MB)
- Cavallin F & Mayer R (2022). **Anomaly Detection from Distributed Data Sources via Federated Learning.** In: Barolli, L., Hussain, F., Enokido, T. (eds) *Advanced Information Networking and Applications (AINA '22), Lecture Notes in Networks and Systems (Springer, Cham)* 450: pp. 317–328
- Ghesmati S, Fdhila W, and Weippl E (2022). **SoK: How private is Bitcoin? Classification and Evaluation of Bitcoin Privacy Techniques.** *Proceedings of the 17th International Conference on Availability, Reliability and Security (ARES 2022)*, Article No. 5: pp. 1–14 (PDF | 857 kb)
- Ghesmati S, Fdhila W, and Weippl E (2022). **Usability of Cryptocurrency Wallets Providing CoinJoin Transactions.** *Proceedings of the Usable Security and Privacy (USEC '22) Symposium*, Article: 2022-285 (PDF | 948 kb)
- Ghesmati S, Fdhila W, and Weippl E (2022). **User-Perceived Privacy in Blockchain.** *Proceedings of the CoDecFin '22 Workshop*, Article: 2022-287 (PDF | 2.2 MB)
- Hartebrodt A (2022). **Federated Unsupervised Machine Learning.** [PhD thesis, SDU] *Syddansk Universitet, Det Naturvidenskabelige Fakultet*: pp. i-177 (PDF | 5 MB)
- Hartebrodt A and Röttger R (2022). **Federated horizontally partitioned principal component analysis for biomedical applications.** *Bioinformatics Advances* 2(1), Article: vbac026 (PDF | 863 kb)
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3.3.10 Gender dimension in FeatureCloud's research data and results

Brief, but important foreword for laypeople: Biologically, “gender” and “sex” are not the same. “Sex” is usually categorized as female or male in society, but there is variation in the biological attributes that comprise sex and how those attributes are expressed. “Gender” refers to the socially constructed roles, behaviours, expressions, and identities of girls, women, boys, men, and gender-diverse people. Also, “gender” can be chosen, while “sex” is genetically set and attributed (but not always resulting in a clear male or female phenotype = appearance and behaviour). While the term “sex” refers to the genetic makeup of a person, the personally felt or chosen “gender” can be quite different from the biological “sex”. Biologically, a person's sex* affects almost every target and disease phenotype. Thus, for all FeatureCloud studies, both sexes were annotated and statistically taken into account as input variables (where applicable and appropriate), in particular for WP8 – ‘Testing and Evaluation in Clinical Translation’. Beyond this, “gender” specifics did not influence the scientific results of FeatureCloud. For gender equity ambitions, we refer to results 3.3.1 – 3.3.9.

**This is not referring to a person's sex-life or intimate relationships, but solely to their genetics.*

4 Open issues to be addressed in future research projects

Two aspects that were identified for improvement in future research projects (within the computer science field) are a) the imbalanced ratio of male to female work package (WP) leaders (FeatureCloud had only one female WP leader), and b) the imbalanced gender ratio among senior scientists and team leaders (amongst the 9 initial and 8 final consortium partners, FeatureCloud had only one female team leader, but not in the role of a senior scientific principal investigator, PI). This resulted in the inability of female early-career scientists (ECS) and trainees to choose a female PI as a mentor. That being said, this fact was not something that could have been changed during the project because WP leaderships had already been assigned during the application stage of the FeatureCloud H2020 proposal preparation.

5 Deviations

There are no deviations to report. The objective to foster gender parity in this very male-dominated scientific field was met, and task 5 (gender monitoring) was fulfilled throughout the hiring process and during each periodic reporting.

6 Conclusion

This report shines a positive light on the gender actions that were undertaken by all partners and the consortium as a whole to address and resolve the (unfortunately) persisting disadvantage females encounter when entering this field of research (computer science). Nevertheless, the many success stories of FeatureCloud – see, for example, Anne Hartebrodt (completed her PhD at SDU and developed important and intricate FeatureCloud solutions within WP5) and Anne-Christin Hauschild (formerly working on WP3 tasks at UMR, now working as a Junior Professor for Medical Informatics at the University Medical Center in Göttingen, Germany) as examples for women succeeding in the rather technical and science-focused areas of the project, and Christina Saak (UHAM), Nina Wenke (UHAM), and Nina Donner (concentris) succeeding in the rather administrative and management-focused areas of the project – have contributed to an increased presence of female professionals within FeatureCloud's workforce and, hopefully, motivated and reassured other women and female early-career professionals to also pursue a career in research or science management.

7 Tables and other supporting documents

7.1 10-step guide to writing inclusive job offers

(source: <https://www.bbva.com/en/an-inclusive-workplace-begins-with-the-wording-of-job-ads/>)

1. Avoid extreme language. This type of language can discourage applications from certain candidates. Words like “expert” can exclude interesting profiles. It is better to use sentences like “at least five years of experience working with this technology”.
2. Avoid words that may convey stereotypes. Words like “compete” or “dominant” reflect masculinity and may deter women from applying to a certain job offer. It is better to use words like “motivation” or “tireless” instead.
3. Avoid unclear or unnecessary requirements. It is better to list essential and nonessential-but-valuable requirements separately.
4. Convey a growth mindset. Companies that are committed to the development of their talent are more likely to attract candidates from underrepresented groups. Expressions that reflect fixed qualities such as “natural-born analytical thinker”, “extremely intelligent” or “constantly outperforming” discourage aspiring candidates who may have high growth potential. The opposite happens with expressions such as “passionate learner” or “motivated to take on challenges”.
5. Demonstrate commitment to diversity and inclusion. It is very advisable to devote some space to describing the company’s commitment to looking for all kinds of talent to build a diverse workforce in which all social groups are represented.
6. Use “you” and “us”. According to Textio, a platform that predicts the type of response job offers will get based on their wording, offers that use “you” and “we” are filled faster. Expressions like “you love finding the best solution to a problem” to address candidates are much better than impersonal ones like “the ideal candidate”.
7. Avoid using masculine nouns and pronouns. Using the second-person singular allows to avoid using masculine nouns and adjectives. However, when a direct reference is unavoidable, it is advisable to use gender-neutral nouns, such as “the person” or “the candidates”.
8. Write as concisely as possible. Job offers should be brief. Ads written concisely are usually filled faster and usually draw in more applications.
9. Emphasizing the Project values and mission is a good practice that should be taken into account when drawing up an offer, as it can help the candidates determine if it is a project where they would like to work.
10. Hiring better starts by writing better. Good writing is, in many cases, the key to promoting inclusion. According to ‘Textio’, openings advertised using inclusive language get filled 17% faster and attract 23% more female candidates.
11. Building a more diverse and inclusive work environment is essential to attract talent. The time devoted to drawing up job ads using inclusive language will yield almost immediate returns, since it will help attracting high-value candidates, who may otherwise choose to skip poorly written postings.

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