UNIVERSITÄT PASSAU

IRIXYS

Activity Report 2024

The International Research & Innovation Centre for Digital Intelligent Systems IRIXYS relies on the close cooperation between the University of Passau (Germany), the University INSA Lyon (France), the University of Milan (Italy) and since 2019, the University of Pau et des Pays de l'Adour (UPPA) in France. IRIXYS activities are based on three pillars.

Firstly, IRIXYS supports academic exchanges, including the implementation of double master's degrees and Cotutelle doctorates, the organisation of workshops for young researchers and the organisation of academic summer schools.

Secondly, IRIXYS makes sure to forge a strong partnership with industry (ATOS, Siemens, etc.) and institutional actors.

Thirdly, IRIXYS relies on top joint research, currently being carried out in the fields of big data analytics, artificial intelligence and IT security, focusing on transversal axes: environmental impact, green IT; ethics, trust and protection of private life; numerical sovereignty and open science.

Following the profound reflexion on the future orientation and development of the common research program initiated two years ago, we started in 2024 implementing the new agenda toward a more sustainable organisation. Starting September 2025, the two main pillar of the cooperation, the University of Passau (UP) and INSA Lyon will open a joint "French-German chair on AI". In this frame, more resources will be allocated to the strengthening and growth of IRIXYS.

The purpose of this document is to report on all activities undertaken in 2024 by and in cooperation with IRIXYS and to assess to which extent this ambition has been fulfilled.

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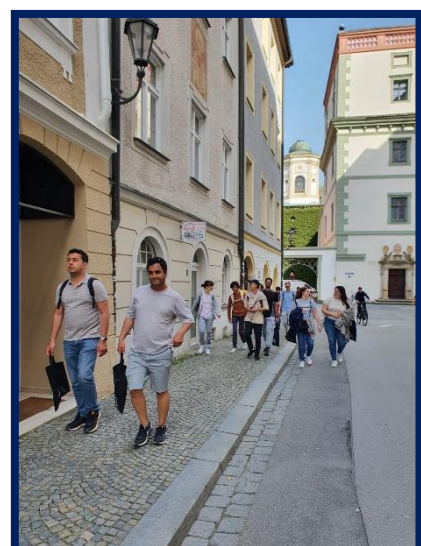
1.1. Consolidation of our academic collaboration

➢ *IRIXYS PhD Track*

The "IRIXYS PhD Track" between the University of Passau and INSA Lyon and supported by the French-German University (UFA/DFH) was conceived to stimulate a bi-national academic postgraduate path: from the start of a Master to potentially achieving a PhD. In 2024, many students have undertaken a double Master and one graduate is about to begin doctoral studies in cotutelle. In 2024 four students from INSA Lyon could come to Passau for the first time to pursue their studies in March. One of the newcomers completed his Master in Passau in 2024, while the three others decided to stay one more semester to fully maximise their experience in Germany. In September 2024 four students of the University of Passau started a PhD Track and begun their studies at INSA Lyon. In the frame of the course dedicated to the double-Master students "working as an IT manager in France, Germany/Bavaria", the social bound among the students (new incomings and returning students from Lyon) was maintained and the group spirit was strengthened through several group activities (welcome evening, experience of the local food, Treasure Hunt to discover Passau, meeting with the future double-Master students).

PhD-Track students

Students during the treasure hunt

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➢ *Cotutelle de thèse*

Dr. Paul Lachat

In 2024, the Chair of Distributed Information Systems of the University of Passau counted four students in cotutelle de thèse (PhD in supervision) with INSA Lyon: Paul Lachat, Ashish Ashutosh, Felix Bölz and Michael Dinzinger (who began the cotutelle end of the year). On April 12th in Lyon, Paul Lachat successfully passed his defense on "*Privacy protection and trust management in Edge Computing environment",* in front of a binational jury. The whole IRIXYS team is very proud of the academic path of Dr. Paul Lachat.

One student officially begun a cotutelle de thèse this year, one external candidate and one PhD Track student should officially undertake their doctoral studies in 2025.

➢ *Double-Master University of Passau and ENSIIE Paris/Evry*

In March 2024, the university of Passau welcomed two Erasmus + exchange students from ENSIIE. One of them decided to turned the simple Erasmus + exchange into a Double Master, she applied and is now part of the program.

Furthermore, the first funding period of the Double Master ended in 2023. After successfully applying to the funding call, the UFA/DFH positively evaluated the program and granted another four-year funding to the Double Master program. The relations between our two institutions strengthen this year and Prof. Kosch was invited in October to meet the new president of ENSIIE and the new program's director. At this occasion, Prof. Kosch could meet with the French students, promote the Double Master and several students already committed to the program for 2025 and 2026.

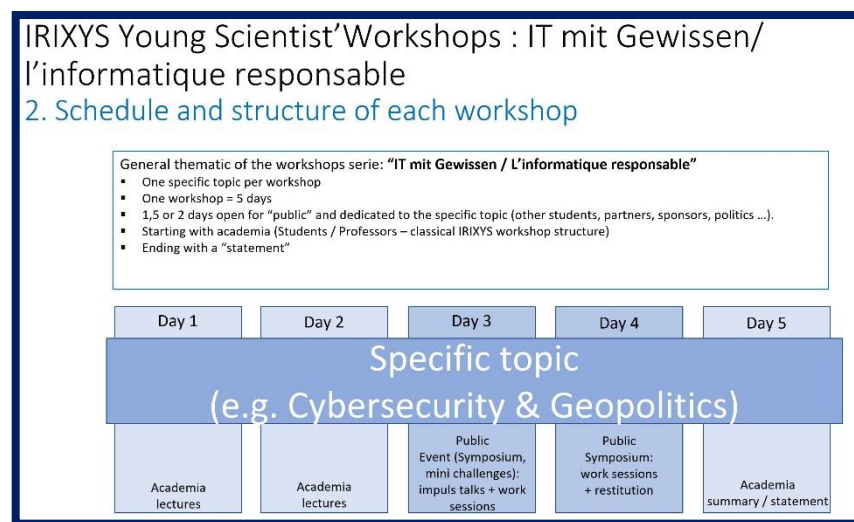## 1.2. Consolidation of our scientific collaboration

The IRIXYS members (former MDPS collaboration) have been organising since 2008 biannual workshops hosted and organised in turn by the four main partners: the University of Passau, INSA Lyon, the University of Milan and occasionally the UPPA.

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During the Young Scientists' workshops, each doctoral student presents the progress of their thesis and the results obtained since the last workshop. All the participants (between 30 and 40 people, researchers and PhD students, from the IRIXYS centre teams, international experts, industrial partners) can thus follow, on a regular basis, the progress of all the IRIXYS PhD students, analyse the results, suggest new investigation and cooperation.

These research workshops, by their regularity and size, catalyse a strong dynamic among the PhD students and reinforce their motivation to advance rapidly and regularly in their research in order to be able to present interesting results during their presentations. They thus form a series of milestones for the students, the researchers and professors to structure the progress of their research.

As described in the "IRXYS Anmeldung Mittelbewirtschaftungsbefugnis 2024", we aim to give our traditional *Young Scientists' Workshop* a fresh boost, strengthen Bavaria's influence in a European context, and address social issues that are currently highly relevant to European civil society. 1,5 to 2 days of the classic workshop week are dedicated to this and we invite a broader audience to participate.

Both scientific topics (AI, cybersecurity, health, etc.) and ethical, societal, legal, and sustainability issues are addressed. The aim of these events is to facilitate interdisciplinary and multidisciplinary dialogue and to act as a bridge between science and society.

Structure IRIXYS Workshops

Normally (when the global sanitary situation allows it) the IRIXYS workshops are organised face-to-face, which is an integral part of the Franco-German-Italian intercultural experience, it enables everyone to dedicate their full attention to the different activities, workshops and meetings and of course it creates a strong group cohesion.

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➢ *IRIXYS Young Scientists' Spring Workshop in Anglet/Biarritz*

13th – 17th of May 2024 in Anglet (France)

The 32nd IRIXYS Young Scientists' Workshop hosted by UPPA (Campus Anglet), took place in person. Some 35 students and professors from INSA Lyon, University of Passau, University of Milan and UPPA participated. Besides the contribution of the doctoral candidates and the presentation/update of their work, this workshop focused on data-driven and AI-guided futures and lead to fruitful and thought-provoking discussions. Indeed, two keynote speakers from the Lebanese American University and the University of Cyprus shared with us their international insights on the topic and then followed a design-thinking workshop organized by UPPA. Participants were gathered in international teams, explored and crafted scenarios where technology and data intersect with societal needs, created a concept (service or product) that fit one special emerging/or futurist need and presented it at the end of the week. The results were very convincing and heterogeneous, exploring the limitless possibilities of AI and Big Data: A secure electronic personal proxy; low-tech autonomous smart robots for community farming; and finally, augmented reality applications to enhance the lives of the elderly. We were shown vibrant presentations, as teams used digital mind mapping to transform their tech-inspired ideas into engaging visual stories. These presentations not only showcased future potentials but also sparked rich discussions on their ethical and societal dimensions.

IRIXYS Workshop May 2024 Anglet 1

IRIXYS Workshop May 2024 Anglet 1

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➢ *IRIXYS Young Scientists' Winter Workshop in Lyon*

9th – 13th of December in Lyon

IRIXYS Workshop December 2024 Lyon 1

The IRIXYS Young Scientists' Winter Workshop in Lyon focused on Generative AI – scoring and challenges in imbalanced data Data governance. With a total of 40 participants from the universities of Passau, Lyon, and Milan, it provided a great opportunity for students and researchers to present their respective topics and receive expert opinions. The workshop took place over a week with a full program with fruitful exchanges and team-building activities, such as a treasure hunt in the old town of Lyon. One of the highlights of the workshop, however, was the collaboration session at the bank headquarters Caisse d'Epargne Rhône Alpes. The IRIXYS members were invited to discuss and share ideas with the Data and AI team of the bank, in order to bridge academic insights and banking industry perspectives on the theme of Artificial Intelligence. After the keynote talks introducing both academic and industry perspectives, the participants were divided into small groups to work on specific tasks related to "Gen AI/ integration to business use case"; "Gen AI/ Data strategy"; "Imbalanced Data". A plenary session was organised at the end to share the results and the participants could network and talk about future cooperation.

IRIXYS Workshop December 2024 Lyon 2

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➢ *Other scientific results and awards*

Scholarships from the German-French University (DFH/UFA) were awarded to two Passau students.

On November 15th, during the opening ceremony of the 26th edition of the Franco-German Forum in Strasbourg, BNP Paribas and Ignite Group Germany awarded scholarships to four outstanding students from DFH/UFA programs. For their excellent academic achievements, Mohammed-Nour Eljadiri and Mark Beckmann, two PhD Track students, were awarded the "BNP Paribas-DFH Scholarship" with a value of 3000 euros.

Award ceremony DFH/UFA 2024

The member of IRIXYS participated in several scientific publications, here a sample of the list for 2024:

Wiem Fekih Hassen, Luis Schoppik, Sasche Schiegg & Armin Gerl (2024): **Power Management Approach of Hybrid Energy Storage System for Electric Vehicle Charging Stations.** Smart Cities, 7(6), 4025-4051. [LINK]

Harshil Darji; Stefan Becher; Jelena Mitrovic; Armin Gerl & Michael Granitzer (2024): **A Dataset of GDPR Compliant NER for Privacy Policies.** Open Search Symposium 2024 (OSSYM2024), 9-11 october 2024, Leibniz Supercomputing Centre LRZ, Munich (Germany). [LINK]

Maud Andruszak; Alaa Alhamzeh; Elöd Egyed-Zsigmond; Anton Carlsson; Johan Leydet & Yasser Otiefy (2024): **Team INSA Passau at Touché: Multi-lingual Parliamentary Speech Classification.** In Guglielmo Faggioli, Nicola Ferro, Petra Galuscakova, and Alba García Seco Herrera, editors, *CLEF 2024 Evaluation Labs*, september 2024. [LINK]

Maximilian Schiedermeier; Omar Hasan; Tobias Mayer; Lionel Brunie & Harald Kosch (2024): **Anonymous voting using distributed ledger-assisted secure multi-party computation.** Applied Network Science, vol. 9, p. 51 [LINK]

Johan Erbani; Pierre-Édouard Portier; Elöd Egyed-Zsigmond & Diana Nurbakova (2024): **Confusion Matrices: A Unified Theory.** IEEE Access, pp. 1-1. [LINK]

Yacine Belal; Sonia Ben Mokhtar; Hamed Haddadi; Jaron Wang & Afra Mashhadi (2024): **Survey of Federated Learning Models for Spatial-Temporal Mobility Applications.** ACM Transactions on Spatial Algorithms and Systems. 10, 3, Article 18, september 2024. [LINK]

Yasmine Djebrouni; Nawel Benarba; Ousmane Touat; Pasquale De Rosa; Sara Bouchenak; Angela Bonifati; Pascal Felber; Vania Marangozova & Valerio Schiavoni (2024): **Bias Mitigation in Federated Learning for Edge Computing**. Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, vol. 7, Issue 4, Article 157, p. 1-35. [LINK]

Fatima Elhattab; Sara Bouchenak; & Cédric Boscher (2024): **PASTEL: Privacy-Preserving Federated Learning in Edge Computing.** Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, vol. 7, Issue 4, p. 1-29. [LINK]

Sonia Ben Mokhtar; Louis-Claude Canon; Anthony Dugois; Loris Marchal & Etienne Rivière (2024): **A scheduling framework for distributed key-value stores and its application to tail latency minimization.** Journal of Scheduling 27, p. 183-202. [LINK]

Claudio Ardagna; Nicola Bena, Chirine Ghedira-Guegan; Nicolò Grecchi; Genoveva Vargas-Solar & Nadia Bennani (2024). **Revisiting Trust Management in the Data Economy: A Roadmap.** IEEE Internet Computing, vol. 28, Issue: 4, p. 1-8. [LINK]

Aghiles Ait Messaoud; Sonia Ben Mokhtar & Anthony Simonet-Boulogne (2024): **Tee-based key-value stores: a survey.** The VLDB Journal, vol. 34, (2025). [LINK]

Marco Anisetti, Claudio A. Ardagna, Nicola Bena, Ernesto Damiani, Paolo G. Panero (2024): **Continuous Management of Machine Learning-Based Application Behavior.** In *IEEE Transactions on Services Computing*, pages 1-14. Link

Inês F. Ramos, Gabriele Gianini, Maria Chiara Leva & Ernesto Damiani (2024): **Collaborative Intelligence for Safety-Critical Industries: A Literature Review.** *Information* 15, no. 11: 728. Link

Marco Anisetti, Claudio A. Ardagna, Massimo Banzi, Filippo Berto, Ruslan Bondaruc, Ernesto Damiani, Alessandro Pedretti, Arianna Pisati & Antonio Retico. (2024): **MUSA: A Platform for Data-Intensive Services in Edge-Cloud Continuum.** In *Barolli, L. (eds) Advanced Information Networking and Applications*. AINA 2024. Lecture Notes on Data Engineering and Communications Technologies, vol 203. Springer, Cham. Link
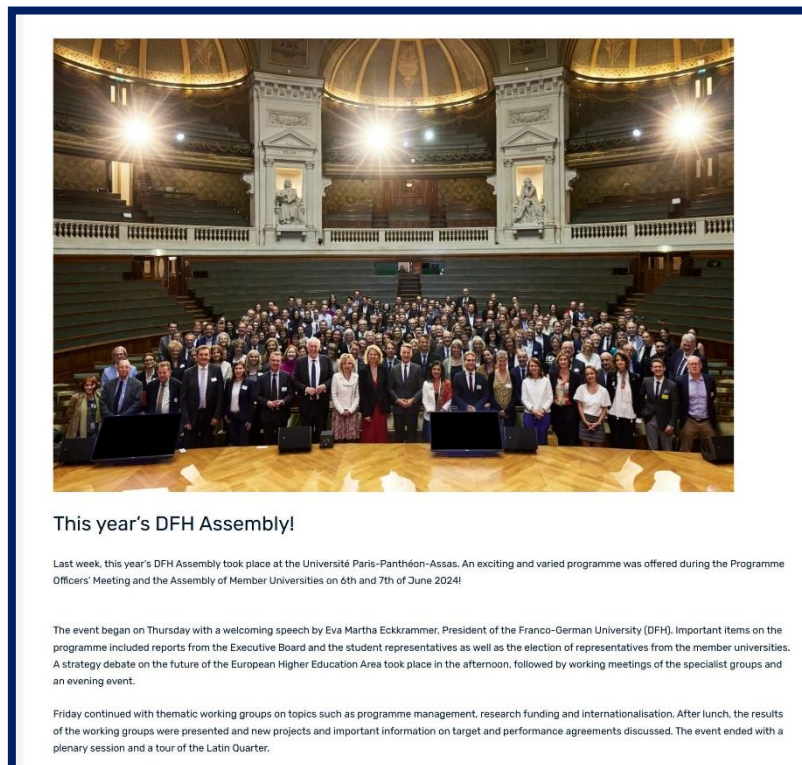
Annalisa Barsotti, Gabriele Gianini, Corrado Mio, Jianyi Lin, Himanshi Babbar, Aman Singh, Fatma Taher & Ernesto Damiani (2024): **A Decade of Churn Prediction Techniques in the TelCo Domain: A Survey**. In *SN Computer Science* 5, 404. Link

2. Policy and Industry Collaborations

2.1 UFA/DFH German-French University:

The UFA/DFH Programme Officer Meeting and Assembly of Member Universities 2024 took place in Paris on June 6th and 7th. The University of Passau and INSA Lyon jointly participated. At this occasion, the participants could exchange about their respective programs, the challenges they are currently facing and how to address them together.

Furthermore, The DFH/UFA and the University of Passau officially announced that the next UFA/DFH Programme Officer Meeting and Assembly of Member Universities will take place in Passau in May 2025. It will be the first time that the University of Passau hosts and organises a binational (German-French) event of this scale. This represents the achievement of the strong French-Bavarian cooperation in Academia and IRIXYS is one important driving force.

DFH/UFA Assembly 2024

2.2 French Diplomacy and European Collaboration

➢ *Bavarian-French diplomacy and IRIXYS*

The IRIXYS cooperation participates to strengthen the Bavarian-French diplomacy.

For instance, the French "attaché scientifique" for scientific cooperation between France and Bavaria from the French embassy, Dr. Emmanuel Delille, visited the university of Passau and sat down with the local IRIXYS team and double master students to talk about the tasks and objectives of the research centre, the experience of the students and their future perspectives.

Furthermore, the French general consul in Munich, Alexandre Vulic, newly appointed in 2024, also took an interest in IRIXYS and its activities. He visited the University of Passau on September 24th for the "francophonie days" and at this occasion, Prof. Harald Kosch could explain him the success of our French-Bavarian academic exchanges. And, on October 17th the Vice President for International and Diversity, Prof. Christina Hansen, visited him in Munich for a strategy meeting and discussed with him the activities of the IRIXYS centre and its agenda for the coming years.

IRIXYS presentation - figures

> ➢ *Other collaborations*

OFAJ/DFJW volunteer 2024:

In September, and for 10 months, the IRIXYS team welcomed a **French Volunteer from the "Deutsch-Französisches Jugendwerk"** (DFJW/OFAJ). This programme has been going on since more than 10 years and Passau welcomed 6 generations of young French volunteers, giving them an overview of the French and European cooperation within the chair of Prof. Kosch with hands-on activities. In 2024 the tasks attributed to the volunteer mainly focused on communication (intern and extern), web redaction and event planning support. For instance, she visited several "Gymnasium" to promote and highlight the different academic programs between France and Bavaria and she organised cultural activities for the double master students.

Erasmus + project SEE ME:

The main partners of IRIXYS (INSA Lyon, University of Passau and University of Milan), along with partners from Hungary, joined forces to respond to the Erasmus + call 2024/2025 "Alliances for Innovation". The consortium wants to tackle the European challenges and opportunities of the digital and green transition, focusing on the circular industry and more precisely on small plastic recycling using AI technologies. In order to do so, the partners will submit the SEE ME project in March 2025, and worked together all year long to prepare a solid proposal including technical and managerial trainings not only for master students but also for SMEs managers and engineers in the field of plastic material flow and sorting/recycling of plastic in IT hardwares using game-changing AI technologies.
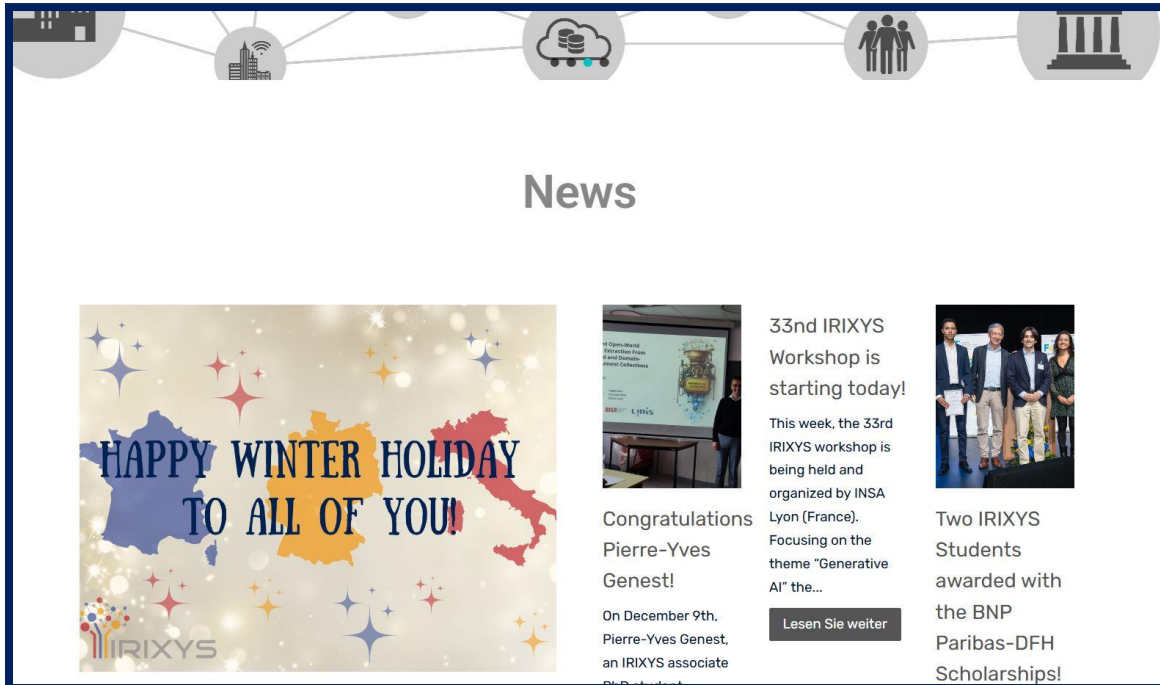
Master MINDS:

The university of Passau and INSA Lyon, in cooperation with the University of Milan and the Autonomous University of Barcelona, are working to develop an international master's degree of excellence in AI funded by the Erasmus + "Joint Master Erasmus Mundus" (EMJM) programme. The Master INtelligent systems for a sustainable Digital transformation of the Society (Master MINDS) aims to provide students with strategic and technical knowledge and skills in the key areas of computer vision and robotics, cybersecurity, distributed systems, AI engineering, in order to become active players in digital transformation and innovation in public and private organisations.

In 2024, the staff focused on the implementation of the new Master and the Erasmus+ proposal to get the funding for the EMJM.
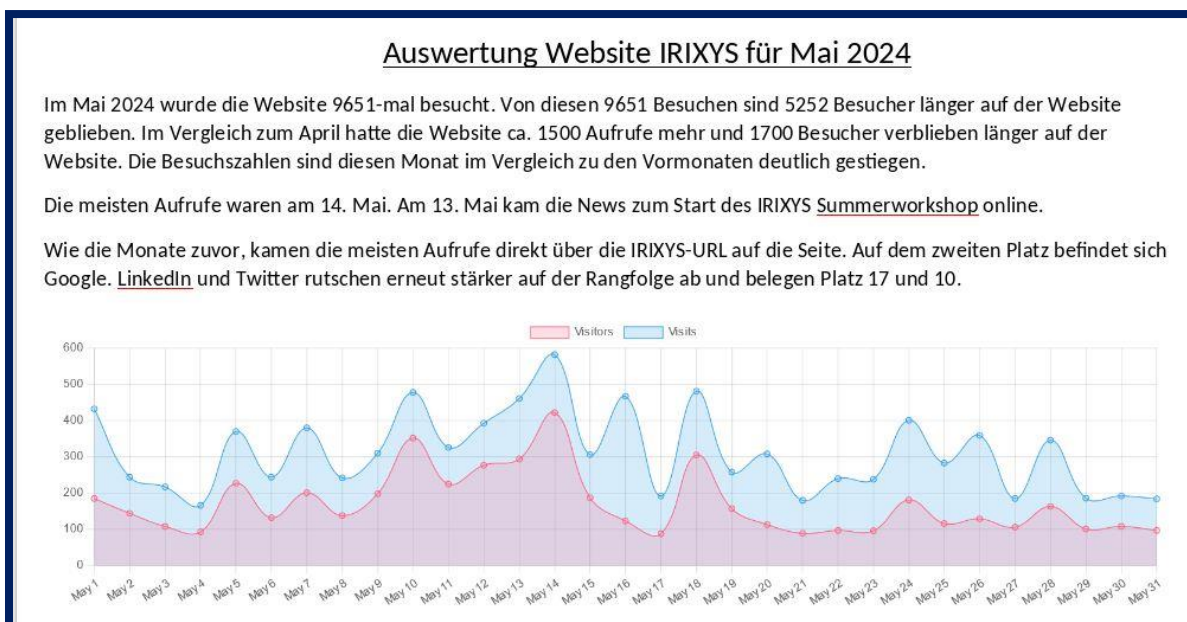
3. Communication

3.1 IRIXYS Website

IRIXYS Website

In 2024 we continued to update and share content on IRIXYS. Furthermore we are monthly monitoring the website, in order to maximize our range and adapt the frequency and content of our posts.

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Auswertung Website IRIXYS für Mai 2024

Im Mai 2024 wurde die Website 9651-mal besucht. Von diesen 9651 Besuchen sind 5252 Besucher länger auf der Website geblieben. Im Vergleich zum April hatte die Website ca. 1500 Aufrufe mehr und 1700 Besucher verblieben länger auf der Website. Die Besuchszahlen sind diesen Monat im Vergleich zu den Vormonaten deutlich gestiegen.

Die meisten Aufrufe waren am 14. Mai. Am 13. Mai kam die News zum Start des IRIXYS Summerworkshop online.

Wie die Monate zuvor, kamen die meisten Aufrufe direkt über die IRIXYS-URL auf die Seite. Auf dem zweiten Platz befindet sich Google. LinkedIn und Twitter rutschen erneut stärker auf der Rangfolge ab und belegen Platz 17 und 10.

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3.2 Picture credits

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