Collaboration between French and German networks and the creation of a sustainable ecosystem - current topics, challenges, recommendations.

"French-German networking on Industry 4.0 and applied Artificial Intelligence"

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1 Executive summary

In an ever more rapidly growing and complex world, driven by the latest technological developments, strong collaboration is becoming increasingly important to survive as an individual player in the global society. This is also the opinion of the project team and the partners of the project "French-German networking on Industry 4.0 and applied Artificial Intelligence[1]". According to the project findings, in particular discussions with project partners and experts participating in the project's Working Groups: focusing on the topics of Artificial Intelligence (AI) and Industry 4.0, there are many **opportunities to drive forward development in diverse fields such as energy, health, and industry**. They hold **great potential for innovation** and can mean enormous economic benefits for small and medium-sized enterprises (SMEs), especially when joining forces. At the same time, dealing with AI and Industry 4.0, particularly in a binational context, means **facing the challenges that involve both technical and cultural aspects together.** It is a matter of jointly meeting technical challenges and navigating around legal and cultural obstacles. Topics that are currently highly relevant to society, such as the shift to an environmentally sustainable production and climate protection, digital transition, adequate health care and efficient production, are to be considered. Thus, the work of the Working Groups and regular exchanges within the framework of the project automatically picked up on current political efforts. Goals from the EU Green Deal[2] or 2030 Digital Compass[3] are reflected in the concerns of the Working Group participants. Speaking from the German perspective, concerns e.g. from the Artificial Intelligence Strategy of the German Federal Government[4], such as strengthen national Research structures, an EU-wide / international cooperation, or aspects such as creating an unique AI network, also with focus on an AI network Germany-France as well as recruiting Top-talents, and strengthen AI skills across the board from the AI Strategy Baden-Wuerttemberg[5] were subject of discussions in the Working Groups. On the French side, the Plan Relance 2030 and the National Strategy for AI[6] launched in 2018 shows a strong focus at all stages of technological AI development: research, development and innovation, applications, marketing and cross-sectoral

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[1] DIZ I Digitales Innovationszentrum (2022). *French-German networking on Industry 4.0. and applied Artificial Intelligence*. Available at: https://www.diz-bw.de/projekte/vernetzung-mit-frankreich/ (Accessed 22 March 2022).

[2] European Commission (2019). Communication from the Commission. The European Green Deal. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2019%3A640%3AFIN (Accessed 25 March 2022)

[3] European Commission (2021). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: 2030 Digital Compass: the European way for the Digital Decade.* Available at: https://ec.europa.eu/info/sites/default/files/communication-digital-compass-2030_en.pdf (Accessed 22 March 2022).

[4] Bundesministerium für Wirtschaft und Klimaschutz (2022). *Strategie Künstliche Intelligenz der Bundesregierung.* Available at https://www.bmwi.de/Redaktion/DE/Publikationen/Technologie/strategie-kuenstliche-intelligenz-fortschreibung-2020.pdf?__blob=publicationFile&v=12 (Accessed 22 March 2022).

[5] Staatsministerium Baden-Württemberg (2018). *Strategiepapier Künstliche Intelligenz.* Available at: https://www.baden-wuerttemberg.de/fileadmin/redaktion/m-stm/intern/dateien/publikationen/Anlage_zu_PM_114_Strategiepapier_KI.pdf (Accessed 22 March 2022).

[6] Ministère de l'Économie, des Finances et de la Relance (2021). *Stratégie nationale pur l'intelligence artificielle-2e phase.* Available at: https://minefi.hosting.augure.com/Augure_Minefi/r/ContenuEnLigne/Download?id=334FD34F-7844-497E-9551-79EDFF3B2EEF&filename=1645%20-%20DP%20-%20Strat%C3%A9gie%20Nationale%20pour%20l%27IA%202%C3%A8me%20phase.pdf (Accessed 22 March 2022).

dissemination, support, and supervision of deployment. The main goals pointed out are strengthen research capacity, train, and attract the best AI talents, accelerate the deployment of AI in the economy, and become a leader in the fields of embedded AI and trusted AI – goals also being discussed in the context of the French-German project. The following White Paper sets out a framework to **advance French-German cooperation in AI and Industry 4.0** in a contested and competitive environment. Looking at the discussion and results of the French-German project, one can see there is **enormous potential** on both sides, even though stronger support is needed to exploit that full potential.

2 Objectives

This White Paper has been prepared by the "French-German networking on Industry 4.0 and applied AI" project team of the DIZ | Digitales Innovationzentrum GmbH[7]. Its purpose is to identify the required needs in the process of development of a French-German cutting-edge technology ecosystem and hereby try to answer the question: how can the collaboration between France and Germany (especially the region of Baden-Wuerttemberg) be organized even better and sustainable for the benefit of both countries in the near future? Therefore, the paper intends to analyze and communicate on what would allow to make such an ecosystem dynamic and influential and the best means to operate it and extend it over time.

For existing and future international cooperation projects, this White Paper outlines **first recommendations on what to consider when laying down the foundation to create a French-German ecosystem.**

This document is not intended to provide the "right" way or all the answers to what is needed to build and operate a binational ecosystem. Rather, it is to highlight the wealth of experience of many real actors - particularly SMEs - in this environment that needs to be supported, by pointing out the relevant thematic topics and challenges in order to find solutions and achieve stronger cooperation. The following remarks are explicitly intended to serve as a basis for discussion, as one of the project goals is to solicit engagement from interested actors and potential partners of the French-German ecosystem.

The insights, obstacles and recommendations provided are mainly based on the results of two sessions of Working Groups, as part of the project "French-German networking on Industry 4.0 and applied Artificial Intelligence". Those Working Groups were held between October and December 2021. Over 60 representatives from SMEs, clusters, university & research institutions, public institutions, economic development agencies and start-ups took part (see Appendix). Some participants have previous experience with such cross-border collaboration, and some have experienced it for the first time. In either case, the participation of several collaborators and experts from both

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[7] DIZ I Digitales Innovationszentrum GmbH (2018). *Das DIZ*. Available at: https://www.diz-bw.de/das-diz/ (Accessed 28 March 2022).

France and Germany, especially Baden-Wuerttemberg, allows to assemble insights about French-German cooperation.

The attendees highlighted examples and experiences of French-German collaboration, best practices for successful collaboration, but also challenges and issues which allow to draw valuable recommendations to the Ministry of Economic Affairs, Labour, and Tourism Baden-Wuerttemberg and to coordinators of international cooperation projects. The following sections will outline the framework of the French-German project and point out the importance and the benefits of international collaboration in the field of AI and Industry 4.0 between the two neighbouring countries.

3 Project overview

In the context of digitization, AI and Industry 4.0 have become increasingly important worldwide in recent years, including in Baden-Wuerttemberg and in France. This is reflected in numerous successful projects and initiatives. In 2017, for example, Karlsruhe, Germany was awarded as the national Digital Hub for Applied Artificial Intelligence[8] by the Federal Ministry for Economic Affairs and Climate Action. Up until now, the Digital Hub Applied AI has been bringing together supply and demand in the field of AI in Baden-Wuerttemberg with its workshops, events as well as networking and matchmaking activities. However, cross-border exchange between German and French initiatives as well as companies are in need of development so far, although both countries would benefit from close cooperation. One aspect among this is networking and close cooperation in the field of AI and Industry 4.0.

In the project "French-German networking on Industry 4.0. and applied Artificial Intelligence" led by the DIZ | Digitales Innovationszentrum, the project partners Allianz Industrie 4.0 Baden-Württemberg[9], bw-i Baden-Württemberg International[10], CyberForum e.V.[11], FZI Forschungszentrum Informatik[12] and Steinbeis Europa Zentrum[13] implemented various networking activities. The project was funded by the Ministry of Economic Affairs, Labour and Tourism Baden-Wuerttemberg. The aim was to strengthen the collaboration between companies and research institutions of France and Germany and to build the foundation of a French-German ecosystem in the field of AI and Industry 4.0. This was done through various formats customized to the needs of the target groups, such

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[8] de:hub Karlsruhe (2020). *Digital Hub Karlsruhe Applied Artificial Intelligence*. Available at: https://digitalhub-ai.de/en/dehub-karlsruhe (Accessed 30 March 2022).

[9] ALLIANZ Industrie 4.0 Baden-Württemberg (2022). *Allianz Industrie 4.0 Baden-Württemberg.* Available at: https://www.i40-bw.de/ (Accessed 28 March 2022).

[10] Baden-Württemberg International | bw-i (2022). *Alles Wichtige auf einen Blick- BW_i für.* Available at: https://www.bw-i.de/ (Accessed 28 March 2022).

[11] CyberForum e.V. (2022). *CyberForum: Hightech.Unternehmer.Netzwerk.* Available at: https://www.cyberforum.de/ (Accessed 28 March 2022).

[12] FZI Forschungszentrum Informatik (2022). *Unsere Forschung gestaltet Zukunft.* Available at: https://www.fzi.de/ (Accessed 28 March 2022).

[13] Steinbeis Europa Zentrum - Steinbeis DE (2022). *Enabling innovators to grow.* Available at: https://www.steinbeis-europa.de/de/ (Accessed 28 March 2022).

as highlight events like AIxIA - the French-German Conference on applied AI[14], Workshops, Meetups between project partners, by supporting start-ups, as well as the above-mentioned Working Groups.

Mutual support and cross-border partnerships allow both Germany, especially Baden-Wuerttemberg, and France to enhance their pioneering position in the fields of AI and Industry 4.0, while intensifying the transfer of knowledge and technology between each other. The importance and relevance of strong cooperation between the two countries as well as the adaptation of cooperation to the key issues of the 21st century are also reflected in the Treaty of Aachen signed by both countries in 2019. It underlines a proactive, efficient, committed and coordinated French-German alliance, especially in the field of digitization as one of the key points of the treaty[15].

Above all, the goal is to create a strong foundation for further networking and to establish working relationships and partnerships i.e., a sustainable ecosystem between French and German companies and research institutions in the field of AI and Industry 4.0. Part of this involves identifying means to facilitate and sustain the exchange of information and knowledge for new partnerships.

4 Results of the Working Groups

For the purpose of identifying possible information and knowledge channels and partnerships, the Working Groups were established. During six online discussion panels and bilateral exchanges (Meetups, Brokerage Day, etc.), French and German stakeholders jointly identified three topics of interest to focus on during the Working Groups: AI & Industry 4.0, AI & Energy, and AI & Health. These were determined in particular with regard to currently politically relevant focal points.

Active participation in the two sessions of Working Groups provided valuable information and allowed to identify opportunities. It was also possible to discuss the topics currently in work and future projects of interest.

In general, there have been drawn following conclusions from the Working Group sessions:

➢ Participants from both countries see the Working Groups as an ideal platform to strengthen cooperation between France and Germany through joint and concrete projects and to exchange experiences and best practices with each other as well as to build new partnerships for AI systems.

➢ There is a wish to structure the French-German cooperation in a binational call for proposals to their members and partners to work on common projects.

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[14] DIZ | Digitales Innovationszentrum GmbH (2022). AIxIA AI Conference 2022. Available at: https://aixia.eu/ (Accessed 28 March 2022).

[15] France Government Organization (2019). *Treaty of Aachen: a new treaty to strengthen Franco-German cooperation and facilitate convergence between the two countries. Gouvernement.fr.* Available at: https://www.gouvernement.fr/en/treaty-of-aachen-a-new-treaty-to-strengthen-franco-german-cooperation-and-facilitate-convergence (Accessed 22 March 2022).

➢ Great enthusiasm has been expressed for matchmaking events between regional actors in a willingness to develop partnerships on the other side of the border, which is perceived as being of real potential for innovation.

➢ On both sides there is a strong willingness to work with specific industrial, energy or pharmaceutical structures of the other country. This shows how important it is to get in touch with corresponding institutions and invite them to cooperate with the French-German ecosystem.

➢ Participants showed a strong need of sharing expertise and data.

The following highlights the topic-specific findings of each of the three Working Groups.

4.1 AI & Industry 4.0

Industry 4.0 is a much-debated topic in almost all manufacturing countries. In the last years, there was a rush to promote Industry 4.0 in many sectors, which made it a real "trend topic". However, the debate has often remained highly theoretical. So, when talking about Industry 4.0, one must be careful not to be too theoretical, but deal with real examples and best practices. It was therefore necessary to make it clear at the beginning of the discussion what Industry 4.0 actually means beyond the hype. In fact, Industry 4.0 "combines production methods with state-of-the-art information and communications technology (…)" and "defines the entire life cycle of a product"[16]. The discussion in the Working Groups once more underlined that there is no doubt that Industry 4.0 has its challenges, also in the common definition. However, participants agreed that an even greater danger is that both, French and German industry will be too slow to take real chances to maintain and implement techniques and working practices in the Industry 4.0 context. In this way, industries would be poorly prepared for the challenges of competing on the world stage. Again, different areas of technology and equipment that have been used successfully in one of the two countries could help close the gap in the other country. However, the flexible exchange of systems and knowledge requires trust. To overcome the practical difficulties of implementation is important as well. This includes issues such as data security and legal requirements.

Current topics on which both French and German experts are working on range from general to very specific problems: production planning and education, predictive analysis, deep learning, quality control and defected detection and smart monitoring, all with the goal of workforce and process optimization. An additional focus lies on the capacity to build accurate digital twins. With these and other topics, some networks and companies are already involved in French-German projects such as the bilateral funding measures[17], which are part of the implementation of the German government's AI strategy and the Hightech Strategy 2025[18]. Here, the Federal Ministry of Education

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[16] Bundesministerium für Wirtschaft und Klimaschutz (2022). *Industrie 4.0.* Available at: https://www.bmwi.de/Redaktion/EN/Dossier/industrie-40.html (Accessed 22 March 2022).

[17] Bundesministerium für Bildung und Forschung (2020) *Deutsch-Französische Kooperation.* Available at: https://www.softwaresysteme.pt-dlr.de/de/deutsch-franzoesische-kooperation.php (Accessed 22 March 2022).

[18] The Federal Government (no date). *Research and innovation that benefit the people. The High-Tech Strategy 2025. Available at:* https://www.bmbf.de/SharedDocs/Publikationen/de/bmbf/FS/31538_Forschung_und_Innovation_fuer_die_Menschen_en.pdf;jsessionid=041FEA5A7C1CD78795FC37EF62BE3226.live471?__blob=publicationFile&v=7 (Accessed 30 March 2022).

and Research and the French Ministry of Higher Education, Research and Innovation are funding high-quality AI research collaborations between France and Germany on the basis of the agreement between the two countries with this bilateral funding measure (purpose of the grant).

4.2 AI & Energy

The topic of energy is one of the predominant issues currently preoccupying society, business, and politics. Climate change, sharply rising energy prices, looming energy supply problems require quick action. Stricter regulations, alternative energy sources or zero-emission policies bring new challenges regarding energy supply and consumption[19]. Technology-based approaches based on AI represent promising solutions here. Experts from industry and research on the German and French side are therefore working and planning various approaches and projects based on Artificial Intelligence and are testing modern energy concepts and components.

Current topics on which French and German experts are working on focus on both, very general and very specific problems. For example, work is being done on increasing energy efficiency with AI in the area of smart grids and district heating. Another very specific task participants are currently working on is AI for people recognition in public buildings for optimal light and heat regulation. AI use cases and demo cases in various business areas, such as predictive maintenance, are of great importance, as they help to clarify the sometimes elusive application possibilities and make AI more tangible.

Looking to the future, the participants also want to address topics such as **the use of AI in the design of image management software** for simplified computer vision projects including analysis of a broad database and plan the **design of further demo cases.** The idea of participants developing joint online courses for knowledge transfer and joint events regarding AI in the energy sector would also support goals of the 2030 Digital Compass such as empowered citizens & businesses as well as digitally skilled population & professionals.[20] **In order to achieve a successful energy transition**, the participants also emphasized that special features such as the **size and shape of the future energy landscape as well as EU wide legislation must be taken into account, and the link to the topic of mobility must be considered**, as these are often closely interwoven.

In this context, problems of regional, national, and European significance are highlighted. The common exchange as well as possible cooperation of France and Germany thus pay off on political objectives: "Accelerating the shift to sustainable and smart mobility" or clean, secure energy as envisaged by the EU Green Deal[21].

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[19] European Commission (2019). *Communication from the Commission. The European Green Deal.* Available at:https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2019%3A640%3AFIN (Accessed 25 March 2022).

[20] European Commission (2021). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: 2030 Digital Compass: the European way for the Digital Decade* Available at: https://ec.europa.eu/info/sites/default/files/communication-digital-compass-2030_en.pdf (Accessed 22 March 2022).

[21] European Commission (2019). *Communication from the Commission. The European Green Deal.* Available at:https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2019%3A640%3AFIN (Accessed 25 March 2022).

For the above-mentioned topics, projects such as the European Digital Innovation Hubs (EDIH), French German Call on AI, Important Project of Common European Interest, or Gaia-X, just to name a few, are therefore particularly important. Some of these projects are already being worked on or are of great interest - all of them have the potential for binational cooperation.

4.3 AI & Health

In the context of the Covid-19 pandemic and the global health crisis ongoing, the topic of health is more than ever at the center of the focus of R&D and innovation. The health and especially the e-health market has developed itself very strongly in the last few months. Practitioners and health care systems are overwhelmed by the number of patients, and they tremendously lack reliable tools to assess disease progression. Thus, new needs have appeared to satisfy the health markets expansion and ensure that the patients are well cared for.

AI and Industry 4.0 have appeared as a major technology to manage the sanitary crises and an opportunity to improve patient treatment and anticipate congestion in health care systems (World Health Organization, 2021)[22]. Major players from the field of AI of the public and private sector, i.e., clusters, companies, universities, regions, research centers and regional and economic development agencies, have here recognized the importance of networking, and especially to establish connections with the neighboring country in order be innovative and face the current market and sanitary challenges.

The participants of the Health Working Group had various profiles and participated in the workshops for many reasons. To name a few, some objectives and expectations of the French-German ecosystem are the exchange of experiences in the field of anomaly detection on sensor data, creating business opportunities, sharing common research and development and training. As well as providing the ecosystem members with experience in explainable AI in the field of health and legal tech or in order to collaborate with the players in the quadruple helix and most of all apply research results of collaborations labs and SMEs into the market. The participants also exchanged on interesting projects they are currently working on, with the objective of gaining insights on what the other country is focusing on and finding common points of interest. These ranged from the **application of AI to computer vision solutions for pre-diagnosis of dental pathogens or diagnostic pathways for multiple diseases using laboratory, imaging, and clinical data, to 3D printing for reconstruction**.

The discussed topics for the coming months are mostly about the use of AI to **intensify prevention, integrated healthcare pathways and data transmission** from patients. Here, focus will be set on the use of **industrial AI on open-source hardware and the use of AI in rural areas of the world** as well as the **use of AI for researching the weather and climate influence on certain diagnostic pathways**. Highlight was also the **EDIH, an EU**

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[22] World Health Organization (2021). *WHO issues first global report on Artificial Intelligence (AI) in health and six guiding principles for its design and use*. Available at: https://www.who.int/news/item/28-06-2021-who-issues-first-global-report-on-ai-in-health-and-six-guiding-principles-for-its-design-and-use (Accessed 22 March 2022).

funding program to support and accelerate the digital transformation of the economic actors of a territory, especially very small enterprises (VSEs) and SMEs.

5 Identified Issues

Three relevant challenges that arise in the context of AI and Industry 4.0 and binational cooperation were identified in the Working Groups. These are set out in more detail below.

5.1 Data sharing

AI requires a broad, high-quality database. Nevertheless, this often presents a challenge. In order to be able to train an AI in a meaningful way, sufficient and very detailed data is essential. This requires data that truly represent and describe the facts one actually wants to train and that are clearly differentiated from the facts one does not want to describe. Therefore, a large amount of reference data is required in order to avoid training the AI incorrectly. However, often these necessary data are missing. In particular, it is very difficult to obtain really meaningful and good data. There are a few reasons for this. One reason is getting access to the data one needs in the first place. Furthermore, huge amounts of data present companies with the challenge of being able to evaluate them at all. This requires a lot of computing capacity, which is not always available. In addition, it must also be considered that the data required and used could be critical data e.g. personal data, which is subject to additional restrictions such as legal conditions and it could also be unclear who is allowed to use the data and to what extent. Moreover, a not negligible factor is the Unique Selling Proposition (USP). Generating this high quality, selective data is associated with an enormous effort. Companies have to invest a lot of time, money and expertise to generate such data. If they do so, this, in turn, can give them a competitive advantage. As a result, there is no or just little willingness to share this data in order to obtain economic benefits. At the same time, the participants also see the questioning of the credibility of "foreign" data as a challenge (for more on this, see chapter 5.2).

In many cases, the above-mentioned factors alone represent a major challenge that must be considered in the area of AI, as they seriously hinder access to good data and thus a functioning and meaningful AI.

5.2 Cultural differences

Even though participants of the Working Groups show strong interest in networking with the partners across the Rhine and are convinced of its importance for being innovative in Artificial Intelligence, cultural differences appear as a major challenge to cooperation. When asked what an obstacle could be to French-German cooperation or what could lead to the failure of a binational ecosystem, the participants expressed mainly concerns about the language used. In their opinion, ignoring language differences and cultural issues at common events would be a mistake and weaken cooperation. When some participants considered it was convenient to discuss in English because they do not master the language of the other country, some other participants expressed how unfortunate

and frustrating it is to them to conduct meetings in English, when there are two neighboring countries, and exchanges and cooperation are strong and long-standing between France and Germany.

Another point of concern is in regards of a difference in commitment and effort put into cooperation. In fact, attendees believe that the partnership could be weakened if the provided materials, publications, and emails are in one language and therefore the content from the partners from the other country is not shared. These doubts are also evident in data sharing. Ecosystem members fear that there will be little willingness to share data or that the validity and accuracy of shared data will be questioned (see chapter 5.1 and 6.1).

While it was noticeable that participants attended the event because they were motivated to network and open to any kind of cooperation, barriers that cultural differences could represent were discussed. It turned out that the participants from France and Germany are aware that differences in business culture and the way of communication can lead to misunderstandings. However, both parties showed high flexibility. Being flexible and open-minded seem an important part in cooperation to all participants. It is essential to realize that while there are differences, they should not be seen as an obstacle to collaboration

The cultural differences can seriously complicate and weaken a French-German networking in the field of AI and Industry 4.0, so it is essential to take this into account.

5.3 Legal and administrative barriers

Legislations can both hinder and promote innovation. Following discussions in the Working Groups, the participants noted rather negative aspects of legislation. Often, even a law which is designed to help to foster innovation cannot be brought about as rapidly as new technological developments and procedures can be implemented. Nevertheless, fast response times and optimum workflows are key in the digital world. Although these emerging issues are not really new, they can be very complex and hindering. For instance, the smart factory with its technically controlled, autonomous workflows is leading to new requirements for the applicable legal framework. This is new, for both countries.

According to the experts, national law and legislation can be a burden but problems also exist when it comes to EU laws. Here again, there are different laws and regulations to be considered. Many project coordinators, SMEs or start-ups are face administrative barriers in French-German collaboration. In the discussion, it was pointed out that both countries, France and Germany, are very willing to promote cooperation, but that this often fails due to a lack of common understanding of the administrative bases. Another argument much discussed was the need for stronger political decision making. From the perspective of the participating experts, there is a need to harmonize economic practices and standards of France and Germany. In this way, jointly developed ideas can be promoted, and weaknesses of existing regulations can be intercepted. Another challenge that emerged is that financial support remains mainly one-sided. Many cross-national projects have the goal of fostering cooperation, but the project is not drawn from a joint budget. Thus, it happens that one partner, in this case the German consortium network

partner, receives financial support, while the French partner is not financially supported by the French Ministry. This can lead to demotivation and limited room for manoeuvre within the framework of the project goals.

6 Actions and Recommendations

When it comes to deepening cooperation, participants expressed some concerns and requirements for a well-functioning cooperation between France and Germany. Based on observations and collected suggestions, recommendations for the successful functioning of a cross-border ecosystem in the fields of AI and Industry 4.0 are provided in the following.

6.1 Data exchange

For a successful implementation of joint AI projects, the development of novel approaches and to be able to keep up with international competition, a **sufficiently stable and meaningful database is of absolute relevance**.

To minimize the challenges of a lack of high-quality data, a **common data repository openly providing and processed training data from various sources can be a great relief for companies that want to work with AI**. On both, the German and French side, companies, and initiatives would like to see such a possibility**. A common tool, such as a Cloud solution, to share data and knowledge** to which both countries have access, is considered relevant and useful. A licensing model that stipulates, for example, that the data made available can be used for own AI projects, but specifies the provision of further data in return, could represent a possible solution. It would also be conceivable to **integrate or cooperate with already existing infrastructures and initiatives** such as the GAIA-X project on the EU Cloud system, which aims to establish "an ecosystem in which data is made available, collated and shared in a trustworthy environment in Europe"[23].

French and German representatives agree that **pushing efforts and working on common platform solutions that provide AI-relevant data and knowledge** could greatly ease the challenges for AI projects. Such a cloud would also be beneficial on a relational level, as it would **increase trust between collaborators on the shared data**. For this reason, there is interest in collaboration and continued exchange between the two countries, despite the awareness that this is one of the most difficult challenges to overcome.

6.2 Consideration of cultural differences

Based on observation and the collected suggestions, some measures regarding communication and cultural aspects are to be implemented for the successful running of a French-German ecosystem in the fields of AI and Industry 4.0. First, it is recommended to plan a longer period already in advance, during which the **participants can get to know each other before even talking about knowledge exchange or business relations**. Observations showed that there is an interest in **focusing more on the relational aspect of cooperation as well**

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[23] Gaia-x (2022). *What is Gaia-X Available at:* https://www.gaia-x.eu/what-is-gaia-x *(Accessed 22 March 2022).*

as cultural themes. For this reason, it would be useful to conduct a couple of sessions, (approximately two or three), where an input is given from a French-German expert who delivers tips and tricks about doing business in the other country. Those **culture awareness sessions** would allow participants to **gain soft skills about business culture in respectively France or Germany.** While getting to know each other, it would enable to build a trusting relationship and hereby overcome possible culture-related misunderstandings. This type of expert intervention could be done for example by French-German institutions qualified to support and provide the necessary input. The value of such sessions, as well as the opportunity for participants to do 1:1-sessions was emphasized by several attendees.

Secondly, the importance to adapt the networking and communication of the activities to the intercultural and multilingual context for a deepened collaboration was drawn. Therefore, one should **provide materials and publications in the language of both sides** and put a certain amount of effort to communicate in French and German, so that every part and culture feels included. In the context of the ecosystem, this means that the project management and coordination team must make the effort to publish information and communicate in both languages. It also means that translators and interpreters are needed during events, which can be quite costly. For reasons of convenience and flexibility, the project's formats have so far been held in English. However, the discussions have shown that there seems to be real added value in communicating in French and German.

Finally, in terms of networking and working on joint projects, it seems essential to hold **face-to-face meetings**. The Covid-19 pandemic unfortunately prevented everyone from meeting in person, but all participants stressed the importance of gathering with each other not only online but a few times in real life to develop stable relationships. Such face-to-face meetings should take place more frequently, especially at the beginning of networking and project launches. Since a certain basis of trust can be built up in this way, experience shows that online meetings are more profitable afterwards. Nevertheless, to constantly strengthen networking, regular face-to-face meetings should be added so that the ecosystem can remain active.

6.3 Unification of legislation and administration

Greater connectivity in areas like data sharing, legal and administrative manners can help to **make companies more agile and robust and enhance greater competitiveness of both countries.**

The unification of legal bases could lead to **common qualifications, standards and certification schemes, a common law, common legislation, and adapted administration.** This in turn would facilitate and promote cross-border cooperation between Germany and France. Of course, the process of assimilating the diverse systems of different countries is difficult and a long-term task. The upcoming digital changes, processes and services will be deeply rooted in all walks of every European citizen, whether it is related to health, energy, or industry 4.0. It is unquestionable, that the future will be data- and AI-driven. Digital services will be key for many parts of the average everyday life of people in the countries of all member states of the EU. Even if the unification of law and administrative hurdles is a long-term process, there should at least be opportunities for official "task forces" willing

to advise SMEs, institutions, and start-ups, regarding legal obstacles in order to support innovation, a goal also pursued by the EU SME Strategy.[24]

Therefore, it must be the ambitious goal of European governments promoting a **common administrative base in Europe in order to manage the various developments and foster innovation**. The lessons learned from this Working Groups, or the proposed "Task Force" can therefore build on the EU eGovernment Action Plans. In particular, if the Task Force and the solutions between France and Germany in terms of legislation and administration bear fruit, this could serve as an EU-wide legal framework.

At least, it would be a considerable option that the next joint French-German project, would be funded equally by Germany and France, as an important step regarding equal resources.

7 Conclusion

During the project, it became clear once again that many actors in all sectors in Germany and France have the desire and demand to use technology and data to improve their operations. Thus, Artificial Intelligence is much more than just a buzzword. It is one of the technologies that is currently driving digitization like no other and influencing society, economy, and politics. It is playing an increasingly important role in areas such as healthcare, energy, and industry, and brings both with it many opportunities, as well as challenges. Many players in Germany and France are already working intensively on this topic in various projects throughout many application fields. The main focus is on how Artificial Intelligence can optimize existing processes, services and products and which new fields can be opened up as a result. At the same time, sufficient high-quality data as the necessary basis poses a challenge.

In order to exploit advantages and master challenges, French and German experts see a joining of forces in a shared AI and Industry 4.0 network as a competitive advantage. Expertise and ideas can be exchanged and strengthened. Projects can be driven forward together and political objectives can be better pursued. However, French-German cooperation also means cultural differences, legal difficulties in international cooperation and, in general the question of sufficient high-quality data as the necessary basis. A French-German network and joint work on projects are therefore advocated by both sides of the Rhine. To support these projects and consequently foster innovations in the field of AI and Industry 4.0, the appropriate course must be set. The project activities carried out over the past months have created a solid basis for a French-German ecosystem on AI and Industry 4.0. In order to keep the ecosystem alive beyond the funding period, the French-German networking project team will conduct a number of activities. These include the creation of an internal database to list the contact details and competences of the members of the ecosystem; the sharing of relevant events and the continuation of exchange

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[24] European Commission (2020). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: an SME Strategy for a sustainable and digital Europe.* Available at: https://ec.europa.eu/info/sites/default/files/communication-sme-strategy-march-2020_en.pdf (Accessed 22 March 2022).

with close partners in the region and cross-border institutions in France. Interested parties are always welcome to join the French-German network.

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Appendix

Working Groups Participants

Participants per Topic		
Topic	**Number**	**Country**
First Working Group Sessions		
Industry 4.0	27	12 French 13 German 1 Greek 1 Swiss
Energy	9	5 French 3 German 1 Greek
Health	11	5 French 5 German 1 Greek
Second Working Group Session (not divided by topics)		
All three topics together	18	9 French 8 German 1 Swiss

Organizational affiliation of the participants	
SME	28
Cluster	8
University/Research Center	8
Public Institution	8
Economic development agency	7
Large entreprise	6
Total	65

Sample of the participating experts

Marielle Campanella, Pôle de compétitivité SCS│SCS Cluster

Jean-Jacques Bernardini, Grand E-Nov +

Dr. Cyrille Waguet, incontext.technology GmbH

Published by

DIZ I Digitales Innovationszentrum GmbH

The DIZ | Digitales Innovationszentrum GmbH is a joint venture of CyberForum e.V. and the FZI Research Center for Information Technology. As a virtual competence center, it bundles existing resources and the know-how of the partners and realizes the basic idea of digital transformation through overarching networking. Baden-Wuerttemberg's strong SME sector benefits from this special alliance of scientific and economic players. The goal is to provide sustainable support for the economy of the state of Baden-Wuerttemberg - and in particular for small and medium-sized enterprises - in their digitization efforts and thus to holistically advance the digital transformation in the state.