Factors promoting skills for digital collaboration in international networks: The DiCoLab model

Overall synthesis report in work package 1

in the BMFTR project: "Digital working and learning in international collaboration networks: Development and testing of a competence and collaboration platform for manufacturing companies"

Acronym: DiCoLab

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Contents

A. Objective and approach

The DiCoLab project aims to develop a competence and collaboration platform for the sustainable design of work and learning processes in international collaboration networks. The objective of work package 1 of the project is to map the conceptual requirements for international, digitally supported collaborations in the form of a factor model. This is presented in this report by means of the **DiCoLab model**.

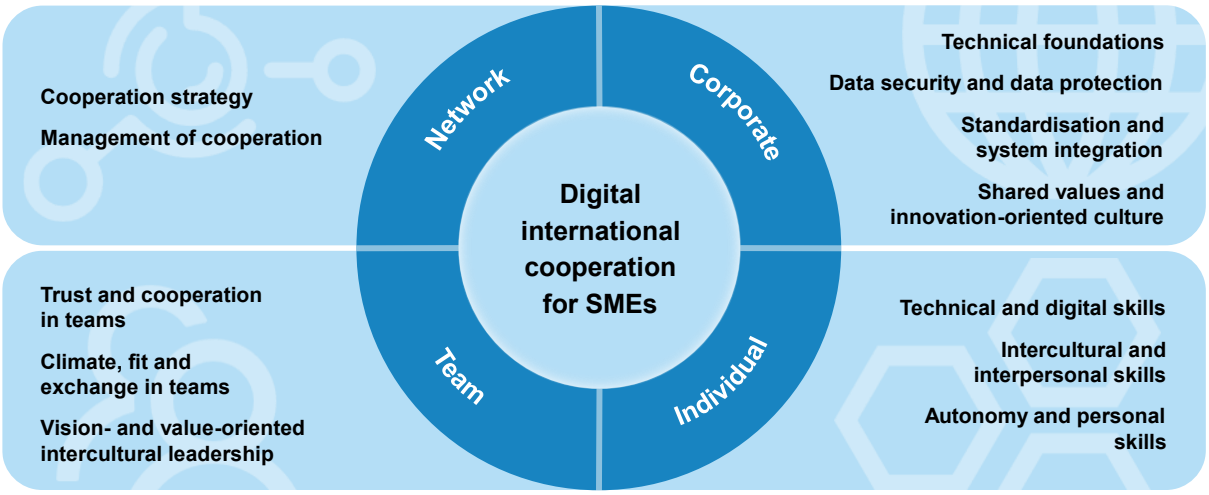
The DiCoLab model was created in four steps. In the first three parallel work steps (1.1-1.3), actual and trend analyses (desk research) were carried out on relevant topics and documented in partial synthesis reports: In work step 1.1, technical challenges in the use of digital collaboration solutions and innovative technologies such as artificial intelligence (or AI) or virtual and augmented reality were identified. In step 1.2, work and organisational psychology factors that promote successful international collaboration were examined, and opportunities for designing socio-technical work systems that promote competence were analysed. In step 1.3, a parallel examination was conducted to determine which principles of open innovation and innovation ecosystems are transferable to digital collaboration networks. The results of the partial synthesis reports were discussed, reflected upon, and subsequently revised in workshops with focus groups. In the final work step 1.4, all results were integrated into this report, and a graphical representation of the DiCoLab model was derived.

Reflection workshops and a final validation workshop ensure that the DiCoLab model is not only empirically sound but also developed in close consultation with the stakeholders involved.

Together with the vision and application scenarios developed in work package 2 of the DiCoLab project, the DiCoLab model forms the content basis for the DiCoLab platform to be developed (work package 3).

The following chapter (Chapter B) provides an overview of the DiCoLab model. This is followed (Chapter C) by a detailed description of the DiCoLab model, which also systematically presents the factors developed to promote skills for digital collaboration in international networks.

B. The DiCoLab Model at a glance



The DiCoLab model presents factors for successful digital collaboration in international networks of small and medium-sized enterprises (SMEs). The factors are divided into **four dimensions**:

1. **Network factors** relate to the strategic design of collaborations. These include selecting suitable partners, developing joint strategies, and transparent management that secures common goals and promotes sustainable relationships.
2. **Corporate factors** form the organisational and technical basis. Reliable regulations on data security and data protection, the standardisation and integration of digital systems, and an innovation-oriented corporate culture create the conditions for smooth cooperation.
3. **Team-related factors** refer to direct interaction at the team level and the influence of managers. Trust, collaborative work, and a positive team atmosphere are just as crucial as active knowledge exchange and value-oriented, intercultural leadership.
4. Finally, **individual factors and competencies** reflect the skills of individual employees. In addition to technical and digital skills, intercultural and interpersonal skills are particularly important. These are complemented by personal skills such as self-organisation and autonomy.

C. The DiCoLab Model in detail

The DiCoLab model summarises factors for successful digital collaboration in international networks of small and medium-sized enterprises (SMEs). It describes a factor model as a holistic framework for international digital cooperation. It is divided into four dimensions that interlock and take into account both technical and human factors.

1. Network factors

This first dimension covers everything related to collaboration between organisations. It includes the following factors:

- **Cooperation strategy**: Successful cooperation arises from the targeted selection of strategic partners, their integration into the network, and the active exchange of knowledge and resources. A central element is active management of partners, which cultivates and develops relationships.
- **Cooperation management**: Formal agreements, clear rules, and efficient processes ensure stability. The ability to bridge intercultural differences in order to avoid misunderstandings and exploit synergies is particularly important.

2. Corporate factors

This dimension refers to the technological and organisational basis within the company itself and includes the following factors:

- **Technical foundations**: A robust network and cloud infrastructure, centralised databases, AI integration, digital twins, and virtual and augmented reality technologies form the technical platform for digital collaboration.
- **Data security and data protection**: Encryption, identity and access management, and backups ensure security and resilience.
- **Standardisation and system integration**: Uniform software, interfaces (APIs), and IT protocols ensure smooth system connections.
- **Shared values and innovation-oriented culture**: Shared values, innovation orientation, and an adapted personnel strategy promote long-term innovation capability.

3. Team-related factors

This dimension concerns effects at the team level. In particular, it concerns the framework conditions and social dynamics within teams, as well as leadership. The following factors are addressed:

- **Trust and cooperation within the team**: Trust is actively built, roles and expectations are clearly defined, and teams are given a high degree of autonomy.
- **Climate, fit, and exchange within the team**: Diversity, cultural fit, and collective knowledge determine the working atmosphere and innovative strength.
- **Vision- and value-oriented intercultural leadership**: Managers need intercultural competence and a clear values and vision orientation in order to lead diverse teams.

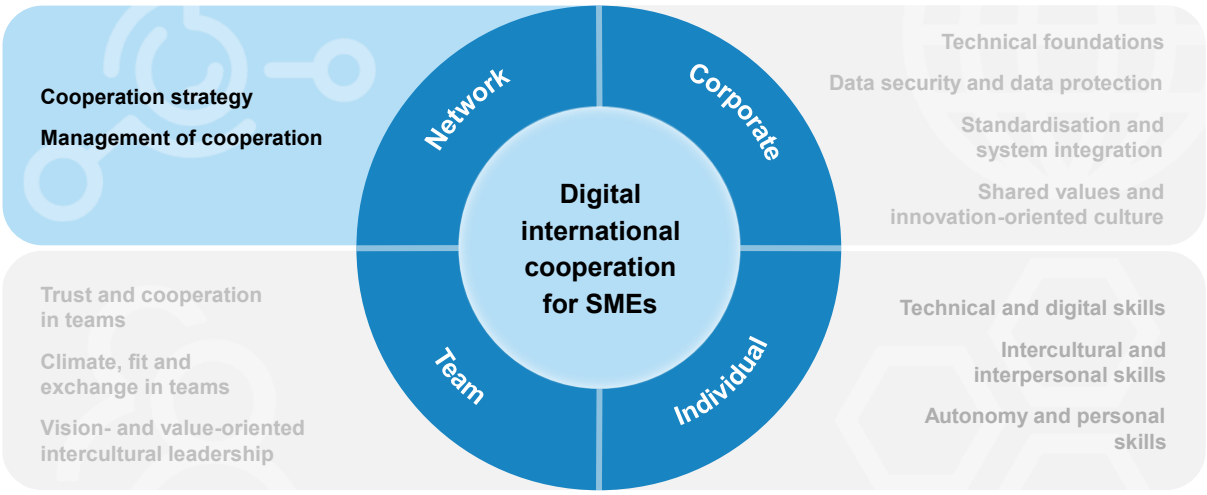
4. Individual factors and competencies

The fourth dimension focuses on the skills of employees. This involves the following factors, primarily at the level of the individual:

- **Technical and digital skills**: Technical knowledge, digital tools, and the ability to impart knowledge are essential.
- **Intercultural and interpersonal skills**: Multilingualism, openness, perspective-taking, intercultural knowledge, and communication skills enable effective collaboration across cultural boundaries.
- **Autonomy and self-competence**: Self-management, resilience, and the ability to switch flexibly between different areas of responsibility (ambidexterity) increase personal effectiveness.

The following pages present the contents of the DiCoLab model in detail, with numerical sorting to aid classification. Each dimension (e.g., 1) contains several factors (e.g., 1.1), each of which is subdivided into further sub-factors (e.g., 1.1.1). Each sub-factor is described according to the same pattern: First, there is a brief explanation of what the respective sub-factor represents. This is followed by a description of its relevance for international digital collaboration. Finally, examples are given of how the respective sub-factor could be specifically promoted.

1. Network factors



Network factors form the basis for successful cooperation between organisations. These include targeted cooperation strategies with suitable partners and the exchange of knowledge and resources. Equally crucial is management through formal agreements and efficient processes that create stability and bridge intercultural differences in order to avoid misunderstandings and make optimal use of synergies.

1.1 Cooperation strategy

1.1.1 Strategic selection of partners

The targeted selection of compatible partners is crucial for efficiently transferring knowledge in international networks, overcoming barriers, and ensuring long-term cooperation in international networks or international collaborations. In addition to the primary hard facts that prompt the initiation of a collaboration (e.g., expansion of the value chain, acquisition of know-how), strategic aspects regarding the compatibility of the partners are crucial. AI enhances this process by automating the selection of partners, coordination and network structures, thereby making international projects more efficient. (Holgersson et al., 2024; Lu, C., Qi, Y. & Yu, 2024; Runiewicz-Wardyn & Winogradska, 2023; Sarpong & Teirlinck, 2018; Terstriep & Lüthje, 2018)

- Relevance: Technological and cognitive compatibility promote overlapping knowledge bases and enable efficient knowledge transfer. Social-personal factors are particularly relevant for SMEs, as they facilitate access to implicit know-how and networks. Trust between the actors is a key factor in reducing transaction costs and strengthening cooperation. At the same time, cultural, legal and organisational differences, such as language barriers, diverging structures or unclear legal frameworks, complicate cooperation relationships and market development abroad. A lack of market information and potential conflicts of interest further increase the complexity of choosing partners. AI can mitigate these challenges by automating the selection of partners and knowledge exchange, identifying suitable

collaborations based on data-driven analyses, and creating flexible, cross-border networks with low barriers to entry.

- Promotion through: targeted selection of partners (technological, cognitive, cultural); confidence-building measures (communication, shared values, IT platforms); standardised contracts and compliance; third-party support (market information, mediation); AI technologies (multi-agent systems, federated learning); long-term relationship management.

1.1.2 Network integration

Integration into regional and global networks, including regional innovation ecosystems, facilitates access to external expertise, technologies, and markets. A high capacity for knowledge absorption is key to efficiently integrating practical and strategic knowledge and implementing cross-border projects. (Audretsch et al., 2023; Budden & Murray, 2022; Cheng, 2022; Guimarães et al., 2021)

- Relevance: Effective knowledge transfer is a key success factor in international cooperation. Regional innovation ecosystems act as a springboard for global cooperation by structurally embedding openness, trust, and coordinated management. They enable the initiation of joint projects, facilitate the overcoming of geographical and organisational boundaries, and promote access to technologies, market opportunities, and pooled knowledge.
- Promotion through: Network agreements; institutional memberships; active use of regional networks with international connections; trust-based relationships; shared principles of openness; coordinated knowledge flows; clear processes and framework conditions.

1.1.3 Access to knowledge and resources

Funding initiatives and cooperation platforms facilitate SMEs' access to knowledge, technologies, and financing and connect them with international partners in a targeted manner. (Interreg Europe Policy Learning Platform, 2023; Oliveira & Rua, 2025)

- Relevance: Joint platforms and programmes integrate small businesses into regional innovation spaces, creating opportunities to connect to international networks. This facilitates access to global knowledge, technologies, and financing, which are key prerequisites for international cooperation.
- Promotion through: Integration into innovation ecosystems (e.g., cooperation platforms such as EROI, European Innovation Ecosystems, Regional Innovation Valleys); cross-sector networking; mobilisation of knowledge and resources; strengthening of absorptive capacity; risk reduction for SMEs.

1.1.4 Active management of partners

Formally managed collaborations with clear rules and active management of cooperation, for example, through strategic preparation, continuous coordination, and active

use of network advantages, increase the impact of international projects. In this respect, the focus here is on the diversity and intensity of the relationship patterns between partners, which can ensure sustainable effectiveness in collaboration. (Srisathan et al., 2022)

- Relevance: The type of cooperation and its coordination have a significant influence on whether open innovation leads to business model innovations. Formalised, strategically managed collaborations in which learning and cooperation processes are clearly regulated are particularly effective. The combination of breadth (diversity of partners) and depth (intensity of exchange) is crucial here. An explicit focus on partner management and coordination processes significantly increases the impact.
- Promotion through: structured cooperation plans; clear communication and learning processes; targeted management of partners; use of human capital; network anchoring; strategic agility; systematic operationalisation of open innovation.

1.2 Management of cooperation

1.2.1 Cooperation agreement

Coordinated goals, shared values, and appropriate structures promote knowledge integration and ensure the long-term stability of global cooperation. These elements are closely related to the corporate strategy and should be linked to it. (Franke and von Braun, 1998)

- Relevance: Coordinated goals, shared values, and appropriate structures create the basis for successful international cooperation. They facilitate systematic knowledge integration, promote intercultural understanding and ensure the long-term stability of cross-border relationships. When these are consistently aligned with corporate strategies and supported by clear commitments within companies, the effectiveness and reliability of international collaborations are enhanced.
- Promotion through: shared value system ("social fit"); clearly defined project goals ("goal fit"); standardised processes (e.g., databases, platforms); CRM systems; feedback processes; targeted controlling.

1.2.2 Transparent rules and criteria for cross-border cooperation

Clear rules, coordinated resources, and reliable relationships create a stable foundation for knowledge exchange and effective cross-border cooperation. (McPhillips, 2020; Meireles et al., 2022;)

- Relevance: International cooperation requires collaborative network structures in which knowledge is shared, resources are coordinated, and trusting relationships are cultivated. Clear communication, a common basis for understanding, and the use of mediating bodies help to overcome cultural differences and ensure the stability of international innovation networks. These elements are key drivers for the success of cross-border cooperation.

- Promotion through: coordinated use of resources; transparent communication; trust-based relationships; open dialogue formats; neutral moderation; common standards.

1.2.3 Efficient and flexible process management

Efficient and flexible process management supports international cooperation through precise knowledge integration, faster decision-making processes, and increased resilience of global networks. Processes should be designed to provide clear structures and orientation while leaving room for adaptation to dynamic conditions. (Broekhuizen et al., 2023)

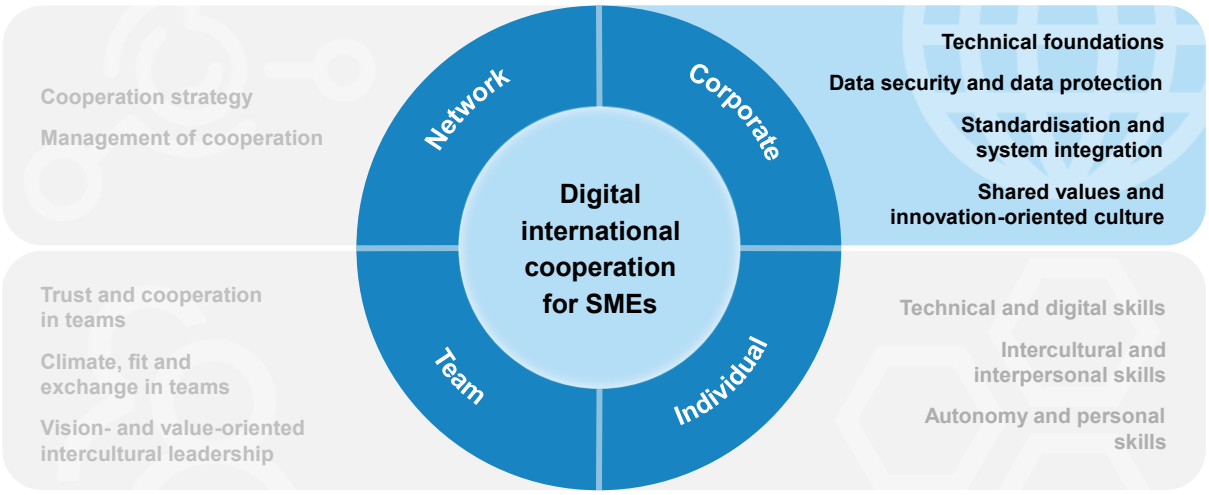
- Relevance: The targeted management of international knowledge flows is crucial for successful collaboration. Central management functions such as mapping, coordination, and control help to enable knowledge integration and avoid conflicts.
- Promotion through: strategic process management; objective process structuring; accelerated decision-making; structured interface control; systematic environmental analyses; increased resilience of international networks.

1.2.4 Intercultural synthesis

Adapted legal frameworks and intercultural training reduce barriers, create the conditions for mutual understanding, and promote the establishment of stable global cooperation. (Audretsch & Belitski, 2023; McPhillips, 2020; West, 2014)

- Relevance: These measures help to bridge cultural differences, reduce trust deficits, and secure cooperation in an international context from a legal and organisational perspective.
- Promotion through: clear legal agreements; harmonised standards; cultural awareness programmes; incomplete contracts with room for adjustment (West, 2014); learning-oriented management; mediation bodies; transparent communication.

2. Corporate factors



Corporate factors form the basis for efficient and secure cooperation in international companies. These include stable IT infrastructures and modern software solutions that enable smooth digital collaboration. Data security and data protection are equally important, as they create trust and ensure compliance. Standardisation and digital system integration unify processes and increase efficiency. Shared values and an innovation-oriented culture also promote trust and commitment.

2.1 Technical foundations

2.1.1 Network infrastructure & cloud technologies as a technological basis

Network infrastructure in the corporate environment refers to all physical and virtual components (such as servers, routers, switches, cables, firewalls and software) that are used to connect devices and systems within and outside the company. It enables the secure and efficient exchange of data and access to shared resources and applications. Cloud technologies refer to the provision and use of IT resources such as storage, computing power, applications or platforms via the Internet. (Dern, 2011; Guggenberger, 2010; Reinheimer, 2018; Weill & Ross, 2004; Wolfinger, 2020)

- Relevance: A stable and powerful network infrastructure is the technical basis for digital communication and collaboration across national borders. It enables secure data exchange, access to cloud services and the use of collaborative tools in real time. It is therefore crucial for efficiency, reliability and competitiveness in international cooperation.
- Promotion through: Investment in modern hardware, cloud solutions and secure network technologies; continuous maintenance, scaling and adaptation to new requirements; targeted IT strategies and further training of specialist personnel strengthen the sustainable development of the infrastructure; selection of suitable providers and gradual expansion of cloud-based solutions.

2.1.2 Databases as central knowledge repositories

Databases are structured systems for storing, managing and querying large amounts of information. They enable the efficient organisation of business data required for decision-making processes, customer management or internal workflows. Databases allow companies to centralise data, keep it consistent and quickly access relevant information. Such database structures also allow decentralised processing in local application fields. (Kemper & Eickler, 2015)

- Relevance: Databases enable companies to store important information in a structured and centralised manner and to exchange it quickly both internally and with international partners. They ensure data consistency and transparency across joint projects and processes. In this way, they promote efficient collaboration and well-founded, coordinated decisions in an international context.
- Promotion through: investment in modern database technologies, adaptation of IT infrastructures and integration into business processes; training of employees in data management, development of clear data strategies; regular maintenance, optimisation and backup of databases.

2.1.3 Integration of artificial intelligence

The successful introduction of AI in organisations requires more than just technological infrastructure. It relies on transparency, ethical responsibility, human oversight and targeted skills development. Similarly, adherence to clear AI guidelines and responsible regulation are essential to ensure safety, fairness, and trust. Only through structural adaptation, excellent data management and cultural change can AI be integrated responsibly and effectively in the long term. (Barenkamp, 2025; Van Quaquebeke & Gerpott, 2023)

- Relevance: Artificial intelligence (AI) supports SMEs in automating and optimising processes, making international cooperation more efficient and reducing errors. AI-based analysis and communication tools enable faster, data-driven decisions and improve understanding of cultural and market-related differences. In this way, AI promotes innovation, adaptability and competitiveness in global cooperation.
- Promotion through: Investment in suitable hardware and software, integration of AI solutions into existing processes, targeted further training for employees; innovation projects and collaborations with external partners (e.g., research institutions); open corporate culture that supports data-driven decision-making.

2.1.4 Digital twin

A digital twin is a virtual representation of a physical product, process or system that is supplied with data in real time to enable analysis, simulation and optimisation. Digital twins, combined with AI and immersive technologies, create new conditions for international cooperation. They enable real-time collaboration across locations, increase

transparency and efficiency, and promote agile innovation processes through a shared, data-based foundation. (Bosch Connected Industry, 2022; Siemens, 2022)

- Relevance: Digital twins facilitate joint development, error detection and adaptation without the need to create physical prototypes. This reduces costs, shortens innovation cycles and makes long-distance collaboration more efficient.
- Promotion through: Investment in suitable sensor technology, data analysis tools and simulation software and their integration into existing processes; training, interdisciplinary collaboration for the successful use and further development of this technology.

2.1.5 Virtual and augmented reality technologies

Virtual and augmented reality technologies open up new opportunities for international collaboration. They not only facilitate communication and coordination across borders, but also promote joint development, customer integration and efficiency. At the same time, it is important to consider the structural and cognitive limitations of virtual spaces in order to fully exploit their potential in global innovation processes. (Architectural Digest, 2020; Heinlein, 2024)

- Relevance: Virtual realtiy technologies make it possible to visualise complex products and processes in a realistic manner and present them interactively to international partners. They improve collaboration by enabling virtual meetings, shared project experiences and practical training regardless of location. This reduces misunderstandings, accelerates development processes and increases the efficiency of cross-border cooperation.
- Promotion through: Provision of suitable end devices and platforms, identification of use cases and integration into existing processes; training and pilot projects support acceptance and effective use.

2.2 Data security and data protection

2.2.1 Data encryption for secure data exchange

Encryption technologies in the corporate environment serve to protect sensitive data by converting information into a form that is unreadable to unauthorised persons. They are used in data transmission (e.g., emails, cloud access) and data storage to ensure confidentiality, integrity and security. This makes them a central component of IT security strategy and data protection in companies. (Beutelspacher, 2014; Wächter, 2021)

- Relevance: These technologies secure the confidential exchange of sensitive data between companies and international partners and protect against unauthorised access. They strengthen trust in digital communication channels while meeting international data protection requirements. In this way, they create a secure basis for stable and legally compliant international business relationships.

- Promotion through: Implementation of IT security guidelines, investment in secure systems, compliance with legal requirements (such as the GDPR); integration of encryption into IT infrastructure, training of employees, regular security checks; cooperation with IT security service providers.

2.2.2 Identity and access management

Identity and access management (IAM) refers to the systematic management of digital identities and the control of access to IT resources and data. It ensures that only authorised persons have access to certain information and systems (depending on their role, function or authorisation). It also increases the security, transparency and traceability of access in digital working environments. Particularly in international cooperation, it is crucial to know which documents originate from which sources, what their (confidentiality) status is, and what purpose they are intended for (e.g., for internal or external use). (Pohle, 2021; Roßnagel, 2001)

- Relevance: IAM ensures that only authorised persons – regardless of location or organisation – have controlled access to shared systems and data. This increases the security of sensitive information in international collaborations and ensures compliance with data protection and compliance requirements. This creates trust, minimises risks and supports smooth, transparent collaboration between international partners.
- Promotion through: increasing demand for IT security, legal requirements and the use of cloud-based working models; introduction of clear role and rights concepts, use of appropriate software solutions, regular security checks; training and awareness-raising among employees.

2.2.3 Data backups & recovery

Data backups and recovery comprise measures for regularly backing up important company data so that it can be restored in the event of loss, system failure or cyberattacks. Backups create copies of data on separate media or in the cloud, while recovery processes ensure that this data can be restored. These strategies are essential for business continuity, protection against data loss and compliance with legal requirements. (Müller et al., 2024)

- Relevance: Ensures the availability and integrity of important information in international exchanges, even in the event of technical malfunctions or security incidents. It protects against data loss and minimises downtime, which is crucial for reliable collaboration with international partners. In this way, it ensures trust, stability and continuity in cross-border business processes.
- Promotion through: legal requirements, increasing IT security needs, technological developments; creation of regular backup plans, use of modern backup solutions, definition of clear recovery processes; training and awareness-raising for employees, regular testing of the effectiveness of measures.

2.3 Standardisation and system integration

2.3.1 Standardised software

This is ready-made, generally applicable software that is used across industries to support typical business processes. It offers proven functions and is regularly maintained and updated, saving companies time and development costs. Due to its wide availability, standard software enables rapid implementation and facilitates integration into existing IT landscapes. Standardised software solutions such as unified communication, groupware systems, project management tools and collaboration platforms create a uniform digital basis for communication, organisation and knowledge exchange. (Daft, 2016; Lu, Qi, & Yu, 2024; Turban et al., 2015; Weißmann & Hardwig, 2020)

- Relevance: Standard software provides international partners with a uniform basis for business processes, ensuring compatibility and efficient collaboration. It reduces implementation times and costs, as proven solutions can be quickly deployed and scaled. Standard software thus supports smooth integration and exchange in global networks.
- Promotion through: Need for efficient, cost-effective and proven IT solutions, technological progress; careful selection of suitable software, training of employees, regular updates and adjustments to business processes; integration of standard software into existing systems.

2.3.2 Standardised interfaces

Open digital interfaces (APIs) in the corporate environment enable standardised data exchange and communication between different software applications, systems or platforms of partners. They promote the integration of internal and external IT systems, enabling processes to be automated and information to be exchanged efficiently. As a result, they contribute significantly to the flexibility, scalability and innovative capacity of digital business models. (Spichale, 2025)

- Relevance: They enable companies to seamlessly integrate and automatically exchange data with international partners across different systems. They promote flexibility and efficiency in collaboration by simplifying processes and reducing sources of error. As a result, APIs support smooth, scalable and fast cooperation in the global business environment.
- Promotion through: Use of modern software architectures, investment in IT infrastructure, promotion of standardisation; provision of development resources, documentation of interfaces, training of internal and external partners; open corporate culture that supports innovation and collaboration.

2.3.3 Standardised IT protocols

IT protocols in the corporate environment are standardised rules and procedures that enable and control the exchange of data between computers and network systems.

They ensure secure, reliable and structured communication within and between IT systems. This makes them essential for networking, interoperability and the smooth operation of digital business processes. (Mandl, 2010)

- Relevance: IT protocols ensure uniform and reliable communication between different IT systems of various international partners. They guarantee data integrity, compatibility and security in cross-border information exchange. They thus form the technical basis for smooth and efficient cooperation in the global business environment.
- Promotion through: Introduction of and compliance with international standards, investment in modern network technologies, training of IT staff, use of compatible systems, regular updates, implementation of security checks, clear IT strategy.

2.4 Shared values and innovation-oriented culture

2.4.1 Value orientation

Value orientation in the corporate environment describes the conscious alignment of decisions, actions and strategies with clearly defined fundamental attitudes. These include, in particular, honesty, fairness, respect, responsibility, respect for human rights, and the promotion of self-determined action based on ethical, social and corporate values. These values create a coherent basis for the behaviour of employees and managers, strengthen the company's position both internally and with external stakeholders, and contribute to securing its identity and reputation in the long term. (Fink, 2024; Permantier, 2021)

- Relevance: In the international cooperation environment, value orientation is indispensable as it forms a common basis for transparency, integrity and authenticity. Values such as respect, fairness and mutual understanding can be used to bridge cultural differences constructively. In addition, the concerns and needs of the operational cooperation networks are prioritised, enabling partnership-based action on an equal footing. A focus on universal human rights signals reliability and responsibility – qualities that international partners recognise as the basis for long-term stability and credibility. Thus, value orientation not only creates a positive climate for cooperation but also facilitates the development of viable and sustainable partnerships.
- Promotion through: clear corporate guidelines, managers acting as role models, integration of the above values into decision-making and business processes; regular communication and reflection on values; anchoring these values in training courses, workshops and target agreements; open feedback culture and recognition of value-based action.

2.4.2 Innovation-oriented culture

An innovation-oriented culture in the corporate environment describes a working environment that specifically supports creativity and openness. It is based on a shared vision of the future for cooperation, a common understanding of quality and excellence, and promotes participation and mutual support in the implementation of new ideas. (Fuad et al., 2024; Zuraik et al., 2020)

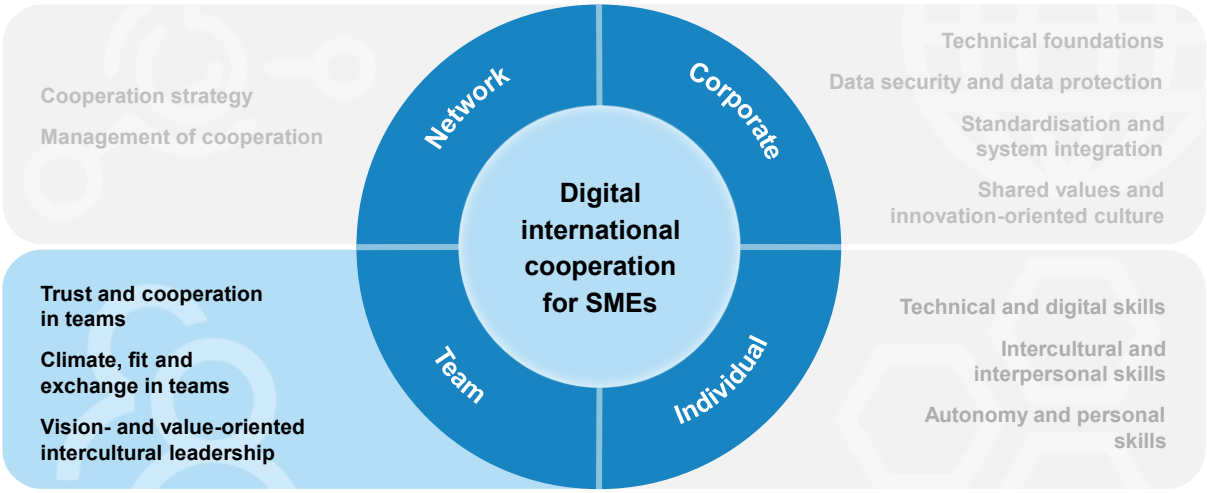
- Relevance: An innovation-oriented culture motivates employees because they are actively involved in creative processes, and a common goal provides orientation. For SMEs in an international context, it enables the development of sustainable solutions, facilitates the exchange of ideas across cultural boundaries through openness, and creates a reliable basis through standards for quality and performance. Mutual support in the implementation of new ideas strengthens innovation capabilities and creates a solid foundation for sustainable cooperation. The innovation-oriented culture forms the basis on which the diversity- and innovation-oriented team climate develops, which is explained in more detail in section 3.1.2. Promotion through: open communication structures, flat hierarchies, appreciation of new ideas; creation of creative freedom, support for interdisciplinary cooperation, active promotion of innovation projects; continuous training, recognition of successes and learning processes.

2.4.3 Adapted human resources strategy

International collaborations benefit from employees with intercultural experience and diversity. An adapted human resources (HR) strategy focused on skills for international collaboration in the selection and training of employees strengthens the ability to collaborate and the innovation potential. An international mission statement and dynamic HR management support the combination of proven processes with the requirements of international collaboration. (Schramm & Schlese, 2011)

- Relevance: A well-thought-out HR strategy with qualified specialists and relevant skills is crucial for international cooperation, as it creates the basis for expertise, innovative strength and competitiveness. It enables SMEs to adapt flexibly to different markets and cultural requirements. An integrated HR strategy that combines traditional and new requirements promotes efficient communication, smooth processes and sustainable cooperation with international partners.
- Promotion through: continuous training and further education, talent development and the acquisition of new skills; adaptation of selection and development processes to international requirements; attractive working conditions, development prospects and programmes to retain employees; an open corporate culture to motivate skilled workers in the long term and strengthen international cooperation.

3. Team-related factors



Team-related factors refer to factors that enable and strengthen successful collaboration in international teams. They include collaborative work and trust management in teams as well as the general team climate in terms of diversity, cultural fit and clear distribution of tasks. In addition, intercultural leadership skills play a decisive role in integrating diverse cultural perspectives and communicating vision and values.

3.1 Trust and cooperation in teams

3.1.1 Trust building & management in teams

Trust is a fundamental "make-or-break" factor in teams, enabling cooperative behaviour and forming the basis for successful cross-cultural collaboration. Proximity between team members plays a crucial role in this, strengthening trust and improving the quality of collaboration. (Grunenberg, Prantl, Heidt & Kals, 2024; Niewöhner, 2019; Schwegler, 2019)

- Relevance: Trust enables open and authentic interaction without strategic games. In this way, it supports generative exchange and is an important predictor of success for international teams. While established employees can strengthen their relationships in international, digitally networked structures through trust, it makes it easier for newcomers to get off to a successful start by providing security and encouraging active participation in team processes.
- Promotion through: Active trust management (e.g., joint commitment to goals, jointly agreed processes and results; participation of all in goal setting and processes; promotion of open interaction with each other) and reduction of factors that damage trust (e.g., avoiding secrets). Promotion of closeness: joint training sessions, regular feedback and communication rounds, personal encounters, tandem programmes, physical meetings as needed

3.1.2 Roles and expectations in teams

Roles represent clearly defined responsibilities and areas of responsibility that are based on shared expectations and structure cooperation. They comprise the sum of the behaviours expected of an individual, which are based on social norms and shaped by mutual expectations of one's own role and that of other team members. (Sell, 2002; Six, 2022)

- Relevance: Clearly defined roles and coordinated expectation management are crucial for successful international cooperation. Only when all participants know who is responsible for what, what expectations exist and what common goals are being pursued can international cooperation be organised efficiently and trustingly.
- Promotion through: Kick-off meetings to clarify goals, roles and responsibilities within the team; creating a team charter and defining common rules; recording transparent role descriptions for all team members in writing; regular coordination on progress and expectations; establishing an open feedback culture in teams (adjusting expectations at an early stage and avoiding misunderstandings); Clarification of roles through moderated workshops or tools (e.g., RACI matrix for visualising responsibilities)

3.1.3 Autonomy in working groups

Semi-autonomous working groups are teams that plan, execute and monitor tasks independently within a defined framework. In international contexts, this means that teams must be able to manage their work processes in a self-organised manner, taking into account common goals, time frames and quality standards. Decision-making, task allocation and problem-solving are predominantly carried out within the team. (Henschel et al., 2011; Kauffeld & Martens, 2019).

- Relevance: International, semi-autonomous teams enable flexible, adaptable and culturally sensitive collaboration across national borders. Personal responsibility promotes commitment, identification with work processes and the use of diverse perspectives for problem solving. At the same time, self-management strengthens the team's resilience to external changes and enables a rapid response to global challenges.
- Promotion through: Empowering international teams: granting decision-making authority; creating a common orientation: clear clarification of goals and roles within the team, introduction of suitable team and project management methods if necessary; collaborative decision-making processes: participatory communication and reflection and feedback formats to strengthen cooperation skills

3.2 Climate, fit and exchange in teams

3.2.1 Diversity- and innovation-oriented team climate

Team climate is understood as the perceived working atmosphere within a team. A diversity- and innovation-oriented team climate is characterised by the fact that diversity (i.e. the diversity of employees in terms of characteristics such as origin, gender, age, education, etc.) is seen as conducive to the development of new ideas through a focus on innovation within the team. The latter is achieved through clear goals and visions, participation, communicative security and support. (Açıkgöz & Günsel, 2016; Anderson & West, 1998)

- Relevance: Diversity orientation helps to leverage differences in international teams, and innovation orientation promotes the quality and quantity of innovations. A team climate that is both diversity- and innovation-oriented not only promotes exchange in international teams, but also strengthens collaboration and innovative performance.
- Promotion through: Goal orientation through clearly defined goals and visions in the team; participation in team decisions; confidence in communicating new ideas and clarity about informal structures in the team (e.g., team norms and procedures); support from the organisation in communication and innovation processes.

3.2.2 Team cultural fit

Cultural fit within the team refers to the extent to which the values, norms, behaviours and working styles of the team members are in harmony with each other and together form a new cultural understanding that is binding for all and is based not on unilateral adaptation to predetermined values, but on a consensus supported by all. (Chatman, 1989; Earley & Ang, 2003; Edmondson, 1999; Karabati, 2024)

- Relevance: In the context of international collaboration, understanding cultural fit is particularly relevant, as people whose values align with the cultural norms and standards of their partners are more likely to achieve their goals and report higher levels of satisfaction. A high degree of fit can also have a positive impact on team atmosphere, cooperation and performance, as there is a shared understanding of how to work and what is considered important.
- Promotion through: cultural awareness training in teams: explicit reflection on one's own values, and conscious team building based on cultural compatibility; cross-cultural team charter: a jointly formulated code of conduct provides orientation and strengthens the feeling of togetherness; promotion of psychological safety: helps to ensure that all team members feel confident to communicate openly and contribute their perspectives.

3.2.3 Collective knowledge in the team

Transactive Memory System (TMS) describes a shared system within a team that functions as a "collective memory", so to speak: who has what expertise ("who knows what") and who is responsible for which tasks ("who does what"). This is based on mutual trust, shared experiences and transparent communication. In addition, a structured knowledge database can support the TMS as a technical platform by permanently storing explicit knowledge and making it available at any time. (Wang, Huang, Davison, Yang, 2018; Wegner, 1987)

- Relevance: A functioning TMS allows teams to use, share, and efficiently organise knowledge in a targeted manner. In international teams spread across different time zones, it facilitates the transfer of knowledge across linguistic and cultural boundaries. By making it clear who has what expertise, uncertainties are reduced and coordination is improved – particularly important when face-to-face meetings are rare. In addition, a structured knowledge database provides access to specialist knowledge, increases transparency, and accelerates knowledge transfer in virtual and multinational teams. This requires clear responsibilities and open communication, which promote the social processes of TMS.
- Promotion through: Regular personal/virtual exchange and reflection and feedback processes (who has what knowledge?) + transparent documentation of knowledge (e.g., knowledge databases, competence profiles) or IT-supported collaboration platforms (e.g., Microsoft Teams, Confluence or Miro) to visualise responsibilities and areas of expertise; clear distribution of tasks within the team.

3.3 Vision- and value-oriented intercultural leadership

3.3.1 Intercultural leadership skills

Intercultural leadership competence refers to the ability of managers to recognise and appreciate cultural differences and to use them effectively in collaboration. This includes both the development of cultural intelligence, i.e. the knowledge, motivation and skills needed to deal with cultural diversity, and the adaptation of one's own leadership behaviour to different cultural contexts. Aspects of servant leadership can be helpful here, with a focus on employee development, appreciation and empowerment. (Ang et al., 2007; Liden et al., 2014; Rockstuhl et al., 2011; Wadhera, 2024)

- Relevance: In international teams, intercultural leadership skills are crucial for building trust and fostering sustainable relationships. Managers who understand and respect cultural differences can specifically address language barriers, different communication styles and differing ideas about hierarchy and decision-making. In addition, prioritising communication and collaboration, encouraging independent task completion and granting autonomy motivates employees. Overall, this can make collaboration more efficient and help to avoid conflicts.

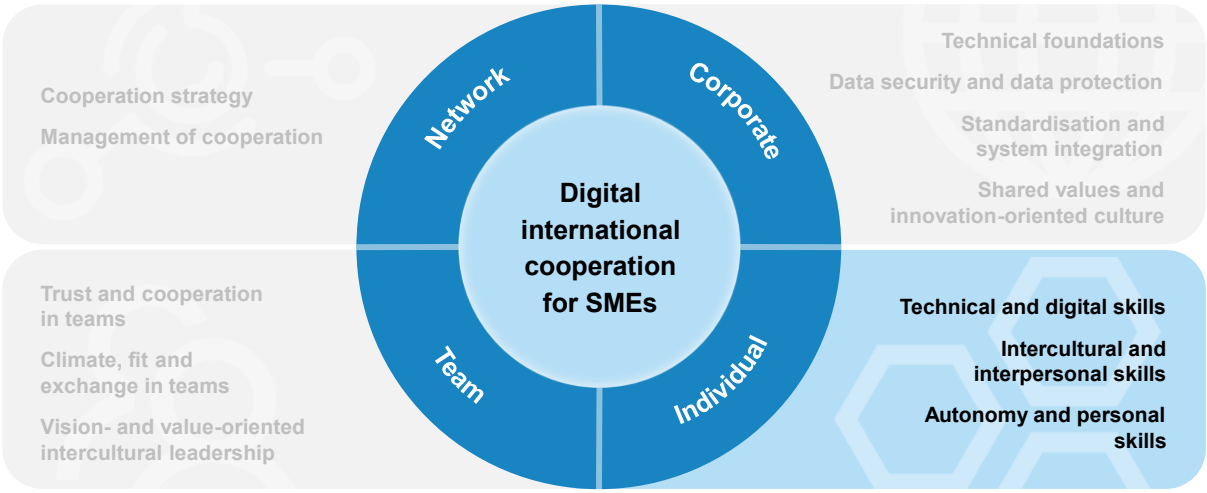
- Promotion through: Leadership training (e.g., interactive workshops and simulations on cultural intelligence, promoting openness and empathy towards other cultures); Training courses on topics such as prioritising communication and collaboration; encouraging intercultural teams to work independently and granting autonomy; experience-based learning opportunities such as assignments abroad or intercultural projects; adapting communication and leadership styles to cultural expectations and norms

3.3.2 Value- and vision-oriented leadership

Vision communication encompasses a leader's ability to convey an inspiring and shared vision of the future. It connects team members across cultural differences by creating a clear direction through a binding orientation towards values and vision. (Bass, 1985; Wadhera, 2024). In doing so, it is important to refer to the fundamental values and vision of an organisation (see also factor 2.4.1).

- Relevance: In international teams, vision communication promotes the integration of diverse cultural perspectives by establishing a binding foundation based on shared values. Emphasising shared values and clearly communicating the shared vision of cooperation strengthens commitment and supports the development of a common understanding.
- Promotion through: Dialogue and participation in vision development to strengthen identification + regular reflection and adaptation of the vision and adherence to values in the team context; development and communication of a clear, shared vision + emphasis on core values in all communication processes; use of culturally adapted language and media to increase comprehensibility and acceptance.

4. Individual factors and competencies



Individual factors and competencies refer to the skills of the individual, in particular, technical and digital knowledge, intercultural and interpersonal skills, as well as aspects of autonomy and personal development. These factors have a decisive influence on how well individuals can contribute to and participate in complex, culturally diverse teams. A successful interplay of these factors facilitates understanding, helps to build trust and enables productive, credible cooperation in international collaborations.

4.1 Technical and digital skills

4.1.1 Technical skills

Technical skills in international collaboration refer to the technical knowledge and practical skills necessary to work effectively in internationally composed teams. This includes both in-depth mastery of one's own field of expertise and the ability to apply this knowledge in an intercultural and often digital context in a way that is understandable and appropriate to the situation. (McPhillips et al., 2022; Peiró et al., 2021)

- Relevance: In international cooperation and in teams operating internationally, professional competence is the basis for productive and credible collaboration. It enables informed decisions to be made, complex problems to be tackled jointly and responsibility for subtasks to be assumed. Individual professional skills are the basis for informed decisions, technical confidence and efficient collaboration in the context of international cooperation.
- Promotion through: Professional development, including a focus on international requirements and developments; integration of international case studies and best practices into training and projects; training in the use of relevant international norms and standards (e.g., ISO, IEEE, WHO guidelines)

4.1.2 Tool and media competence

Tool and media literacy refers to the ability to use digital tools and media effectively and confidently to support communication and collaboration. This includes both technical knowledge of various applications for asynchronous and synchronous communication and the ability to troubleshoot problems during digital meetings. At the same time, awareness of data security in the sense of cybersecurity awareness is necessary in order to design digital work processes in a responsible and secure manner. (Cramton, 2001; Olson & Olson, 2000)

- Relevance: In international cooperation, competence in using digital tools is essential for effective collaboration regardless of time and location. This includes the use of platforms for asynchronous collaboration (e.g., Miro, Notion or Trello). Technical know-how regarding virtual conferences, such as dealing with time zone planning, simultaneous translation and video stability, is crucial for minimising barriers and ensuring smooth communication. Equally essential is an awareness of data security in the sense of cybersecurity awareness in order to ensure the protection of sensitive information in digital collaborations.
- Promotion through: training courses and tutorials on the digital tools used; teaching knowledge of time zone planning and the use of translation technologies; training in troubleshooting and dealing with technical problems in meetings; provision of support and help materials for users; promotion of cross-cultural sensitivity in dealing with technical and linguistic challenges.

4.1.3 Knowledge transfer and communication skills

This aspect refers to the ability to prepare and communicate (technical) knowledge in such a way that it is understood and accepted in a context-appropriate manner in digital and intercultural environments. This includes methods such as targeted visualisation, adaptive language and media-appropriate format language that take different cultural backgrounds and digital communication channels into account. (Kampermann et al., 2021; Klitmøller & Lauring, 2013; Oberländer et al., 2022) Interpersonal communication skills (see sub-factor 4.2.4) can also be helpful in this regard.

- Relevance: In global and virtual teams, it is essential to convey knowledge not only in a technically correct manner, but also in a way that is interculturally accessible and appropriate for the medium. Communication tools and formats have a decisive influence on how knowledge is encoded, transmitted and understood. Adequate communication of (technical) knowledge facilitates knowledge transfer and enables a common understanding of issues in international collaboration.
- Promotion through: Use of multimodal presentation (text, images, structure, examples) to cover different cultural ways of learning and perception; Development of language and translation skills to convey technical content in a way that is appropriate for the target group; Training in digital communication to address media-related limitations (e.g., lack of facial expressions, delayed feedback); Use of

adaptive language and culturally sensitive examples to convey content accurately and comprehensibly; Feedback loops for feedback on comprehensibility

4.2 Intercultural and interpersonal skills

4.2.1 Multilingualism

Multilingualism refers to the active and flexible use of several languages in professional and social contexts. Knowledge of foreign languages, i.e. the ability to use one or more languages at different levels in addition to one's mother tongue, is particularly necessary in international communication. (Council of Europe, 2001; Grosjean, 2010; Meyer-Ross et al., 2014)

- Relevance: Foreign language skills are a key competence for international cooperation and effective communication in a global business context. Openness to linguistic diversity and a willingness to engage in intercultural communication also help to overcome barriers and strengthen the ability to act in international contexts.
- Promotion through: Foreign language courses for employees (e.g., business English or industry-specific terminology); e-learning & language apps; offering tandem programmes within the company; use of AI-supported translation tools (e.g., DeepL, ChatGPT); multilingual team composition.

4.2.2 Integrative, intercultural mindset: openness & perspective-taking

An intercultural mindset is characterised by openness and the ability to take on different perspectives. Taking on different perspectives (understanding other points of view) and openness form the central foundations of integrative thinking. (Cui et al., 2023; Li et al., 2018; Vogel & Hunecke, 2024)

- Relevance: Openness to new points of view and ideas is the basis for perspective-taking. Perspective-taking, i.e. putting oneself in someone else's shoes, makes information from different angles usable and brings together different perspectives in international, digital collaboration. Together with intercultural knowledge, an integrative, intercultural mindset promotes cooperation and exchange in international teams.
- Promotion through: Training + structural adjustments: Methods such as cross-training, perspective-changing exercises, coaching, moderated digital spaces ("perspective spaces"); remote or on-site training formats.

4.2.3 Intercultural knowledge and intercultural experiences

Intercultural knowledge and experience promote awareness and the ability to work successfully with people from different cultural backgrounds. Knowledge of differences in context (explaining more vs. speaking more directly), understanding of time (punctuality vs. flexibility), spatial behaviour (e.g., personal distance or proximity) and information processing (speed and structure, patience and clarity) is essential. (Earley & Mosakowski, 2004; Hall & Hall, 1990; Meyer-Ross et al., 2014; Stahl et al., 2010)

- Relevance: Intercultural knowledge and experience facilitate dealing with cultural differences in communication, understanding of time, spatial behaviour and information processing. An understanding of different business practices and communication styles promotes openness and supports respectful, effective collaboration. At the same time, intercultural experiences strengthen individual adaptability and problem-solving skills in diverse teams – both of which contribute to the stability, innovative strength and success of international projects.
- Promotion through: Intercultural training in relation to: Context (intercultural communication training, awareness of different communication styles), understanding of time (workshops on international time cultures, e.g., in dealing with appointments, punctuality, deadlines), spatial behaviour (training in non-verbal communication, intercultural role-plays), information processing (training in intercultural learning and working styles; exercises on simplifying and structuring information).

4.2.4 Interpersonal communication skills

Interpersonal communication skills encompass knowledge, motivation and abilities in the area of general communication. This includes the following areas in particular: connection, clarity, personal closeness, trust and respect. (Purhonen, 2012)

- Relevance: The individual's ability to communicate competently and skilfully is a fundamental prerequisite for sustainable international cooperation. This enables the establishment of connection, personal closeness, trust and respect with partners through clear and credible communication.
- Promotion through: Communication training or exchange formats: raising awareness and learning techniques relating to connection (e.g., mutual support, integration into networks, establishing contact with new employees), clarity and credibility (e.g., clear expression, availability even in difficult situations, good preparation for meetings), trust and respect (use of convincing arguments and obtaining reasons, mutual feedback) and personal closeness (sharing relevant information, informal meetings and exchanges).

4.3 Autonomy and personal skills

4.3.1 Self-management

Self-management refers to the ability to consciously plan, organise and control one's own tasks, goals and resources. It encompasses both the structured design of work processes and the ability to respond flexibly to unexpected challenges with strong problem-solving skills. In an international context, this means independently and constructively shaping one's own way of working in culturally and organisationally diverse environments. (Caligiuri, 2012; Greif, 2022; Kuhl, 2001; Kolm, 2024; Rosenstiel & Nerdinger, 2011)

- Relevance: Self-management is essential in an international work context, as it enables independent and flexible action across time zones and cultural differences. Adaptability, self-reflection, problem-solving skills and goal orientation are crucial for the success of decentralised teams.
- Promotion through: Use of digital planning tools (e.g., Trello, Asana) for coordination across time zones; Training on time blocking and the Eisenhower principle for effective time management; Structured reflection formats such as 360-degree peer feedback; Clear goal agreements using the OKR method to promote focus and personal responsibility; Virtual collaboration training for using digital tools and asynchronous communication.

4.3.2 Individual ambidexterity

Ambidexterity means "being skilled with both hands". Individual ambidexterity refers to the ability to develop (new) skills exploratively and to expand (existing) skills exploitatively. This is characterised by a balance between exploration and exploitation as learning strategies: simultaneously or alternately carrying out exploratory activities (e.g., experimentation, discovery of new approaches) and exploitative activities (e.g., application of proven skills). (Gong et al., 2025; Rosing & Zacher, 2017; Salas-Vallina et al., 2023)

- Relevance: Enables flexible switching between proven knowledge/know-how (exploitation) and new learning/exploration (exploration) in international contexts.
- Promotion through: Structural and collaborative conditions (contextual ambidexterity, e.g., flexible time management between exploration and exploitation) and international experience (helps to apply newly acquired skills in global teams); inspiring and inclusive leadership; team knowledge sharing supported by digital tools

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