

41st Conference of Rectors and Presidents of European Universities of Technology, 22 September 2023

No Digital Transformation Without the Human Factor

Univ.-Prof. Dr. habil. Katharina Hölzle, MBA
Institute Director at IAT University of Stuttgart and Fraunhofer IAO

in cooperation with



University of Stuttgart
Institute of Human Factors and
Technology Management IAT



Background

My home institution(s)

IAT at the University of Stuttgart and Fraunhofer IAO



Founding Years: Fraunhofer IAO – 1981
IAT at the University of Stuttgart – 1991

Annual Budget: 43,2 Mio. €*

People: 652 employees*

www.iao.fraunhofer.de
www.iat.uni-stuttgart.de

* As of February 2023



Institute's management (left to right):

Dr.-Ing. Florian Herrmann (deputy)

Univ.-Prof. Dr. habil. Katharina Hölzle, MBA

Univ.-Prof. Dr.-Ing. Oliver Riedel (currently MD)

Prof. Dr.-Ing. Prof. e. h. Wilhelm Bauer

Application-oriented Research for Business and Society

Fraunhofer IAO and IAT of the University of Stuttgart


630+
Employees


43.2
Mio. EUR
turnover

7 
Locations and
research
facilities



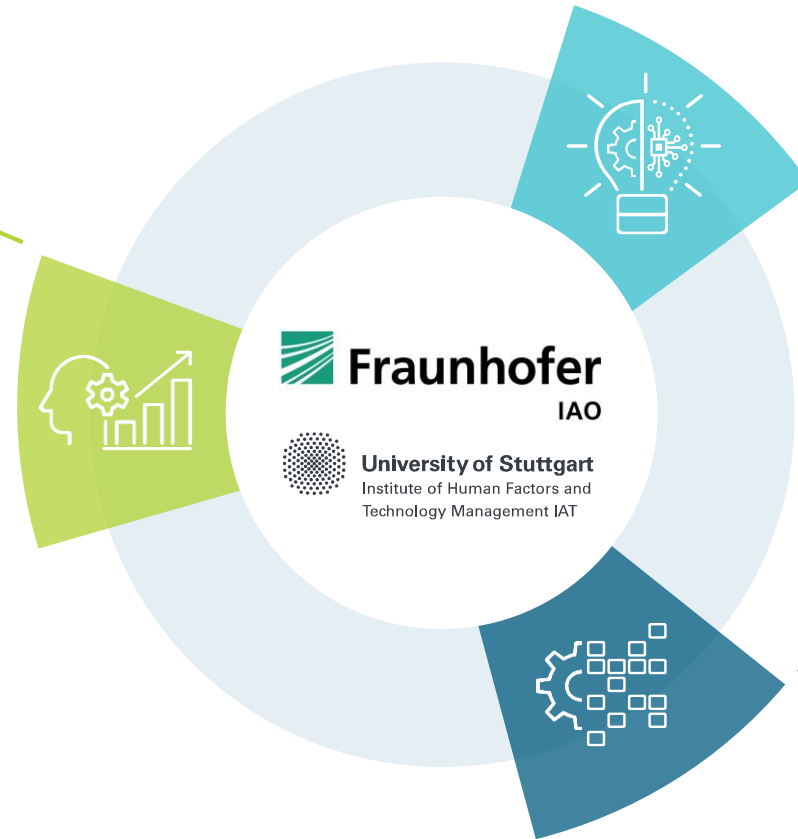
- Center for Responsible Research and Innovation CeRRI, Berlin
- Fraunhofer application center KEIM, Esslingen
- Research and Innovation Center for Cognitive Service Systems KODIS, Heilbronn
- **Werksviertel**-Mitte Munich, living lab
- Fraunhofer Innovation Engineering Center **IEC**, Bozen (Italy)

Research and Development Fields at IAT/IAO

Work and innovation in the digital transformation for a sustainable world

Research on employment & corporate development

- Knowledge and innovation work
- Production work
- Service work
- Workforce transformation
- Change management

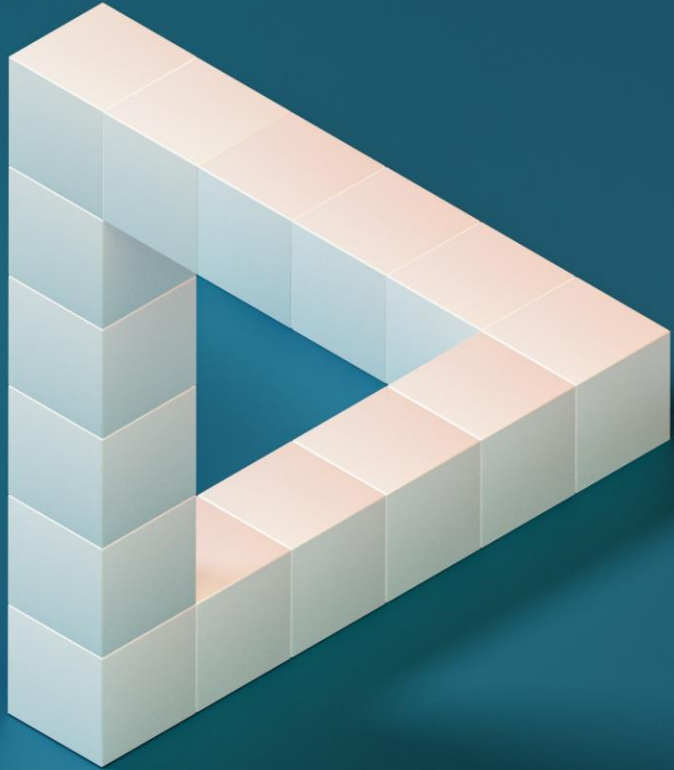


Technology & innovation management

- Technology radar
- Foresight and scenario management
- Smarter cities
- Mobility innovations
- Smart energy solutions

Digital transformation

- Product development
- Smart services
- Digital business models
- AI and learning systems
- Quantum computing



f (Technology,
Human,
Organization)

Today's Estrangement of Technology, Human, and Organization

Catalyzed by recent crises, implicit gaps have become explicit

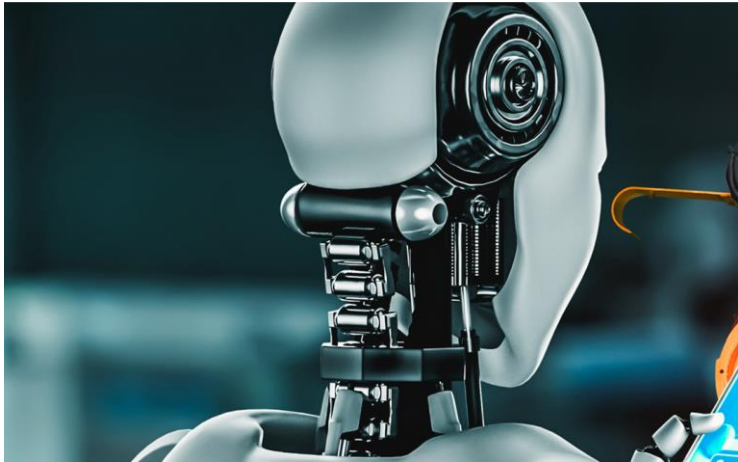


Pressing questions:

- How can we leverage the opportunities of **rapidly progressing technologies** for, in, and from our work?
- How can we arrive at a more **common understanding** of what a (humanized) future of work looks like in practice?
- How can we **sustainably innovate and digitalize** when facing economic and societal disruptions?

Integration challenges

Examples of technological, organizational and individual factors



Infrastructure

Central question of suitable interfaces for collaboration (cf. hype caused by user:inside-friendly generative AI such as ChatGPT) as well as corresponding systems, data, etc.



Orchestration

Consideration of various factors, including collaborative configuration, fit in (innovation) processes, goals of the organization

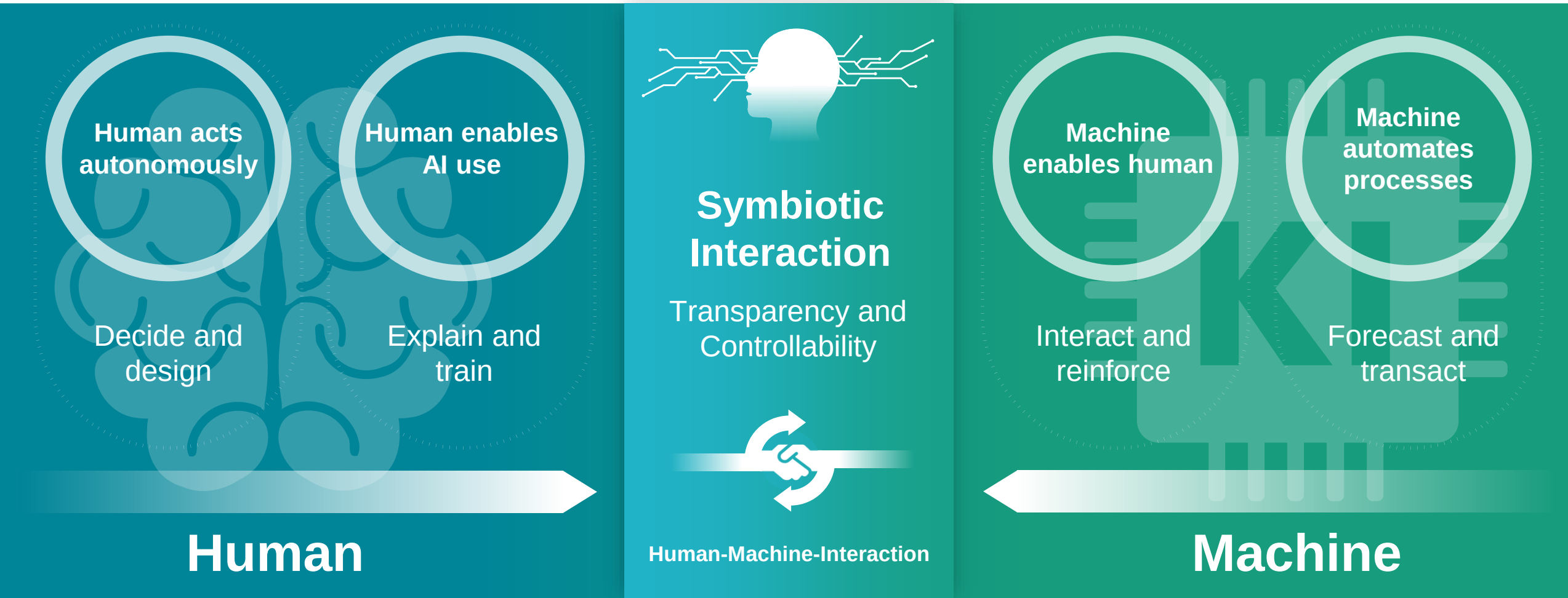


Education

Focus on employees' "future skills" in digital, traditional, and transformative competency areas - e.g., willingness to learn, ability to solve problems, and ability to make judgments

New Rules for Digital Interaction

Symbiotic interaction or dissonant coexistence of humans and machine?



Gamechanger Generative AI

Application potentials between substitution and assistance

Where does AI replace the human?

- Degree of impact of generative AI dependent on type of industry and business unit (e.g., McKinsey, 2023)
- Generative AI increases the automation potential of certain areas of activity - e.g., software development, design, etc. (Dwivedi et al., 2023)

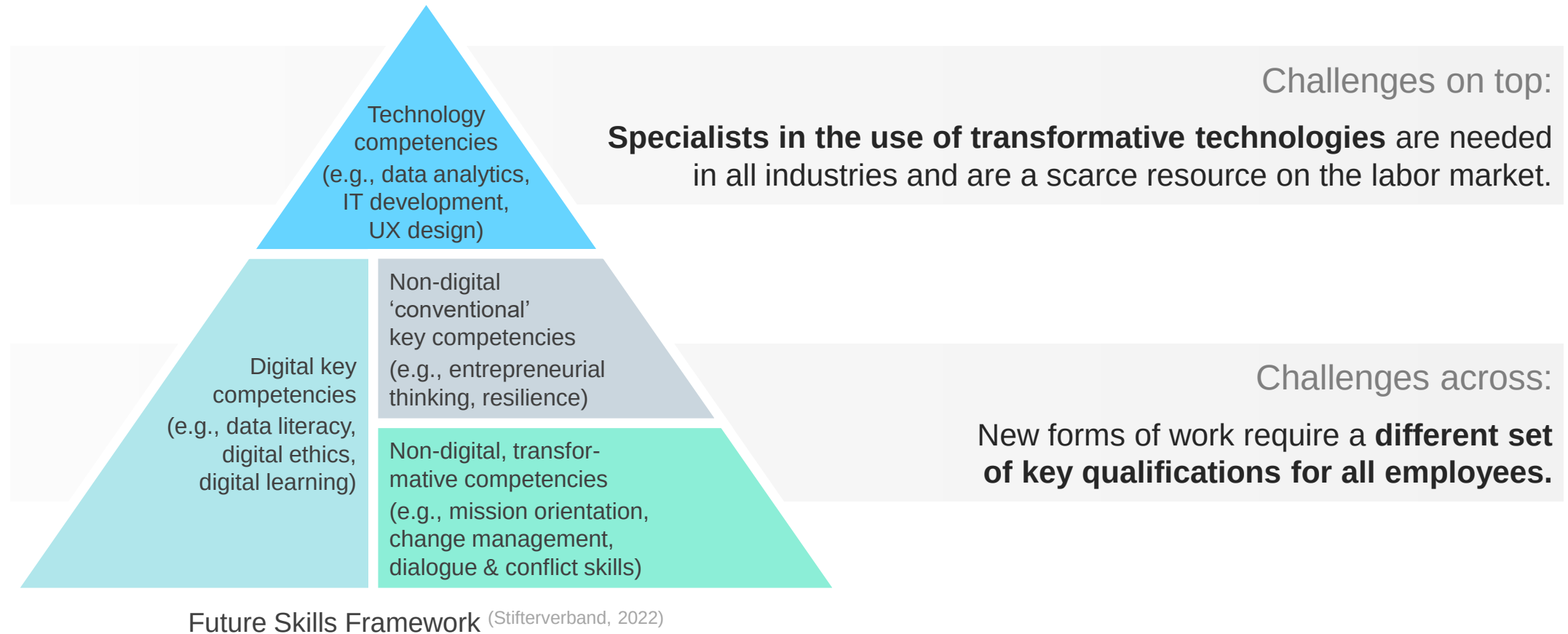
Where does AI support the human?

- Increased efficiency and productivity by taking over routine administrative tasks (Dwivedi et al., 2023)
- Enables focus on tasks that require creativity, interaction, and strategic thinking (Löser et al., 2023)
- Some AI "creativity" and "learning" possible



Skills of the Future – Four Key Areas

Mastering the transformation to a sustainable and digital economy through education



Organizational “disruptions”

Selected developments



Need for meaning, autonomy, participation

- Individual desire to reconcile fair and meaningful work

(Blustein et al., 2023, Hofmann et al., 2019)

Convergence of physical and virtual work

- Integration of hybrid work places and according instruments necessary



Increasing flexibility of work location and time

- Different expectations for work location and working styles (i.e., workation, 4-day-week)

Integration of AI

- New imprint of knowledge-intensive (collaborative) work
- Open legal and ethical questions





Some examples from our
work at IAT/IAO

Living Research at IAT/IAO

Future Work Lab

- Experience artificial intelligence and digital assistance systems live in the innovation lab
- Shaping the future of the digital world of work with new technologies
- Demonstration of Industry 4.0 applications, offers for competence development and work research



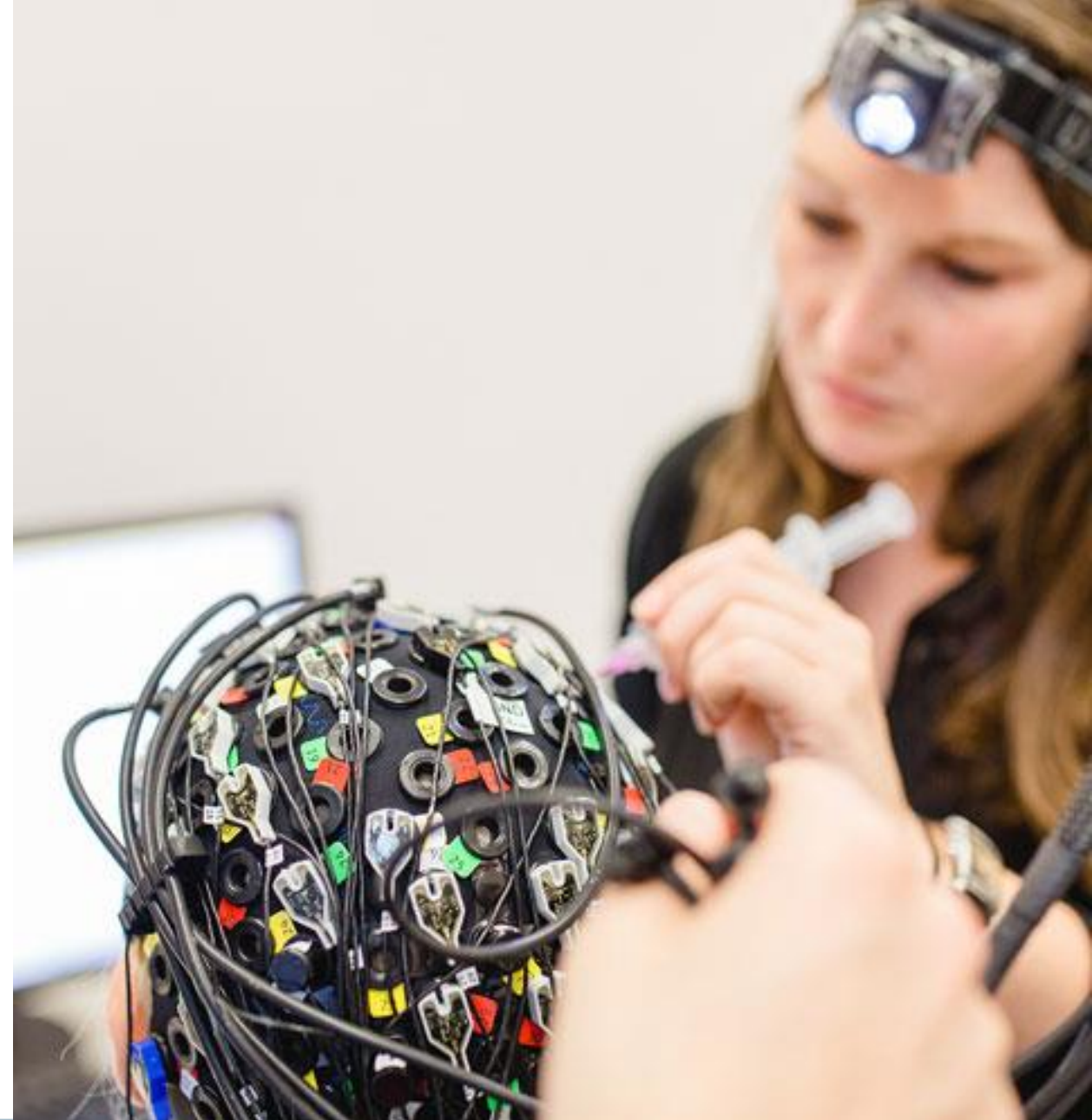
Walk through
virtually



Living Research at IAT/IAO

NeuroLab – Neurowork Science Laboratory

- Neuro-physiological methods and behavioral observations for the analysis and improvement of human-technology interaction
- Aligning the increasing intelligence and autonomy of technical systems with the needs of humans





Office 21® Innovationsnetzwerk
Forschungsphase 2023 – 2024



Projektbroschüre:
www.office21.de

Vom Büro zum
Innovation Hub

Research Topics:

New employee typologies

What are the different typologies of employees and how do different hybrid work models affect them?



Digital, social booking systems

How can socializing and innovation in the office be promoted and orchestrated through digital tools?



The office as corporate innovation hub

How do half-empty offices become places of innovation and what influence does presence have on innovation performance?



The Human and Technological Factor in the Digital Transformation

Outlook and recommendations



Considerable technological potential for companies

- **Knowledge development** through active use of digital technologies
- **Relief of employees** (e.g. in the service area, reporting)
- **Increased productivity** in software development



Research and Development Need

- **Availability of training data** in relevant languages
- Identification, implementation and testing of **use cases**; methods for **benchmarking** and **evaluation**
- **Performance improvement** and optimization for required resources
- **Reliable recognition** of AI-manipulated texts and media



Enabling the Human

- **Overcoming the "digital divide"** on an individual and organizational level
- **Learning** through concrete examples of application
- Creating scope for transfer to own organization - **enabling culture**
- A **modern understanding of leadership and psychological security** are key for innovation - in presence and virtually.

Thank you!

Univ.-Prof. Dr. habil. Katharina Hölzle, MBA
katharina.hoelzle@iao.fraunhofer.de
[linkedin.com/in/katharinahoelzle](https://www.linkedin.com/in/katharinahoelzle)



Universität Stuttgart
Institut für Arbeitswissenschaft und
Technologiemanagement IAT



Fraunhofer
IAO



References

- Bachmann, N., Rose, R., Maul, V., & Hölzle, K. (2023). What makes for future entrepreneurs? The role of digital competencies for entrepreneurial intention. *Journal of Business Research*, under review.
- Blustein, D. L., Lysova, E. I., & Duffy, R. D. (2023). [Understanding decent work and meaningful work](#). *Annual Review of Organizational Psychology and Organizational Behavior*, 10(1), 289–314.
- Dimov, D., Maula, M., & Romme, A. G. L. (2023). [Crafting and assessing design science research for entrepreneurship](#). *Entrepreneurship Theory and Practice*, 47, 1543–1567.
- Dries, N., Luyckx, J., & Rogiers, P. (2023). [Imagining the \(distant\) future of work](#). *Academy of Management Discoveries*, forthcoming.
- Dwivedi, Y. K., et al. (2023). [Opinion Paper: “So what if ChatGPT wrote it?” Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy](#). *International Journal of Information Management*, 71, 102642.
- Kim, S. (2022). [Working with robots: Human resource development considerations in human–robot interaction](#). *Human Resource Development Review*, 21(1), 48–74.
- Kraus, S., Ferraris, A., & Bertello, A. (2023). [The future of work: How innovation and digitalization re-shape the workplace](#). *Journal of Innovation & Knowledge*, 8(4), 100438.
- Landers, R. N., & Marin, S. (2021). [Theory and technology in organizational psychology: A review of technology integration paradigms and their effects on the validity of theory](#). *Annual Review of Organizational Psychology and Organizational Behavior*, 8(1), 235–260.
- Recker, J., Von Briel, F., Yoo, Y., Nagaraj, V., & McManus, M. (2023). [Orchestrating human-machine designer ensembles during product innovation](#). *California Management Review*, 65(3), 27–47.
- Seeber, I., Bittner, E., Briggs, R. O., de Vreede, T., de Vreede, G.-J., Elkins, A., Maier, R., Merz, A. B., Oeste-Reiß, S., Randrup, N., Schwabe, G., & Söllner, M. (2020). [Machines as teammates: A research agenda on AI in team collaboration](#). *Information & Management*, 57(2), 103174.
- Tekic, Z., & Füller, J. (2023). [Managing innovation in the era of AI](#). *Technology in Society*, 73, 102254.
- van Laar, E., van Deursen, A. J. A. M., van Dijk, J. A. G. M., & de Haan, J. (2017). [The relation between 21st-century skills and digital skills: A systematic literature review](#). *Computers in Human Behavior*, 72, 577–588.
- Pictures & Icons: 365 Archive, Adobe Stock, Noun Project