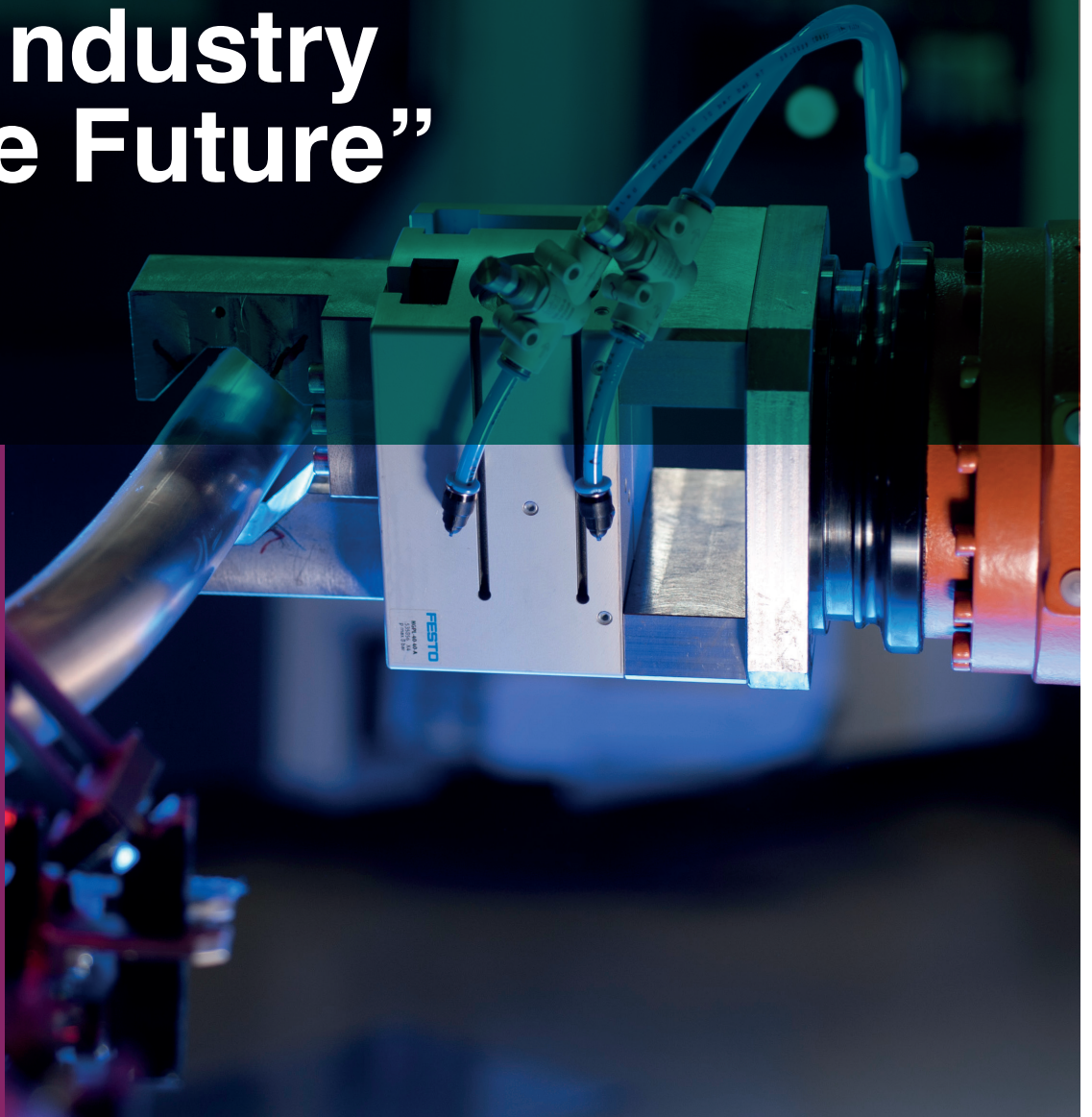


# French-German Institute for “Industry of the Future”



# Mission Statement

Placed at the heart of Europe, Karlsruhe Institute of Technology and Arts et Métiers are key leaders of education, research, and innovation in engineering. To pursue their mission of being the reference institutes supporting ground-breaking innovation and to accompany manufacturing paradigm revolution, KIT and Arts et Métiers have now joined their strengths to create the French-German Institute for “Industry of the future.” Based on a collaboration in the education of mechanical engineers for more than twenty years now, the newly established institute focuses on digitalization, advanced manufacturing processes, and human beings as a central part of the factory and prepares European engineers for the industry of the future. Furthermore, the French-German institute will synergetically foster strengths in research and innovation in the field of production in both countries. The institute addresses the priorities of the High-Tech Strategy of the German government and the ‘Nouvelle France Industrielle’ map of the French government. The collaboration will ensure long-term prosperity of France and Germany in a strong Europe.



**Ivan Iordanoff**

Dean for  
Research  
& Innovation  
at Arts et  
Métiers

**Thomas Hirth**

Vice-President  
for Innovation  
and  
International  
Affairs at KIT



# Editorials



**Philippe  
Darmayan**

President  
of “Alliance  
Industrie du Futur”

Building the factories of the future is one of the main objectives of the French industrial policies. In particular, the French SMEs are to be digitized. For the first time in history, the digital era opens up a new horizon of opportunities regarding business models, industrial ecosystems, and complementary technologies. In this international environment, the French initiative “Industrie du Futur” gives priority to collaborations with Germany, focusing on three main objectives: Sharing knowledge and prioritizing French-German projects; Developing innovative training programs to be prepared for the challenges of the new industry; Sharing French and German policy-making strategies. The Institute for “Industry of the Future” of KIT and Arts et Métiers will significantly contribute to this holistic vision.

**Henning  
Banthien**

Secretary General  
of Plattform  
Industrie 4.0



Plattform Industrie 4.0 is the central network to advance digital transformation towards Industrie 4.0 in Germany. In close cooperation with politics, industry, science, associations and trade unions, it develops and coordinates information and networking services to make Industrie 4.0 solutions better known among companies and to deploy them on site.

Plattform Industrie 4.0 actively drives forward cooperation at a European and international level. Therefore, it welcomes the teams of Arts et Métiers and KIT in their rollout of the French-German Institute of Industry of the future. Its major topics fit those of Plattform Industrie 4.0. Initiatives like the French-German Institute will strengthen the French and German Industry in joint activities together with academia.



# Objectives / Structure

**With the support of key industrial partners, our goal is to create, transfer, and transmit to the new generation of engineers and technology experts highest-quality technology-oriented research and education to master future challenges (globalization, climate change, digitization, energy transition, and raw material change, etc.).**

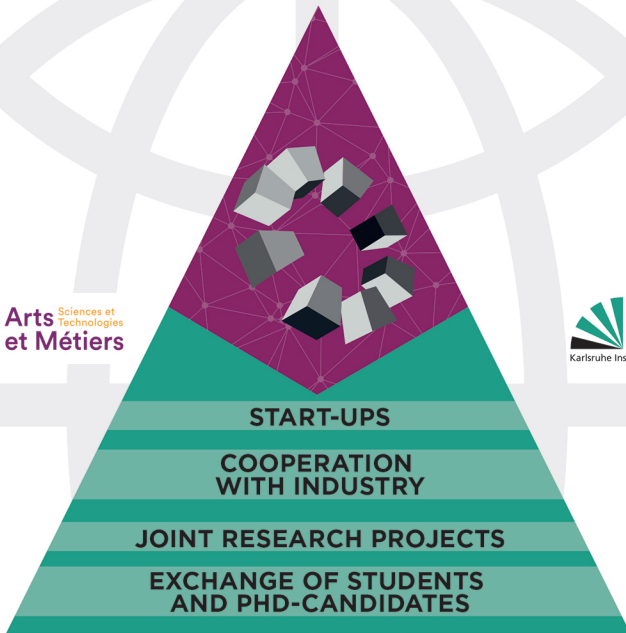
**In particular, the French-German Institute for “Industry of the Future” is committed to:**

- Fostering joint programs in the field of further education to upskill the existing industrial workforce and train the next generation of engineers for mastering new challenges in the current and future manufacturing sector.
- Creating and structuring a research & technology platform to foster and facilitate cross-border scientific research with the aim of supporting the digitalisation of the German and French industry.
- Proposes a strategy that places humans at the center of the industries of the future, and developing a program of actions to foster a human-centered approach.
- Creating a strong link between the French-German Institute for “Industry of the Future” and strategic industrial partners by research cooperation with major industrial players and innovative SMEs as well as acceleration of the transfer of research results into industrial applications and markets.
- Facilitating and encouraging innovation and entrepreneurship through a cross-border incubator bringing together researchers, academics, innovative industrial partners, and start-ups active in Industry of the Future.

The education and training program is elaborated based on the successful joint degree program already in place, an outcome of the 20-year collaboration between KIT and Arts et Métiers which will be enlarged to include joint PhD supervisions of doctoral theses as well as life-long learning. Its structure provides for a close interaction between experts and industrial partners from all over the world. The unity of the research and education programs is expected to create high-added-value training for the new generation of engineers. With a balanced combination of engineering research and innovation, we will convey the appropriate skills to experts facing the challenges of the current and future manufacturing sectors in a global and intercultural context.

The institute, together with its industrial partners and its vision of international open-mindedness, aims at establishing the perfect framework to enhance competitiveness of Europe through our contribution, as a first-rank Institute, to European education for the Industry of the Future.

# INNOVATION



# EDUCATION AND RESEARCH



Bundesministerium  
für Bildung  
und Forschung



Bundesministerium  
für Wirtschaft  
und Energie



# Description of the four main axes of cooperation

**Our research focuses on four areas: Production Systems, Robotics, Virtual and Augmented Reality, and Advanced Manufacturing Processes. Each of these areas benefits from the world-class expertise of KIT and Arts et Métiers faculty, researchers, and staff. The four research axes are strongly interconnected and linked to a human-centered approach that will ensure knowledge generation and technology transfer. The human-centered aspect as well as the zero-defect and agile manufacturing approach are of crucial importance to the institute.**

## **Production Systems**

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Production systems will undergo a significant change in the future. The industry of the future will be shaped significantly by the opportunities associated with digitization of products, processes, and resources. Future production systems will be characterized by high complexity, agility, and they will be highly performing, environmentally friendly, and socially sustainable. This working group mainly focuses on agile value networks, excellence in manufacturing, and the human factor. We combine theoretical and lab work and feedback from case studies in industry, in France, Germany, and globally.

## **Robotics**

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Flexible robot-based production concepts will be a key factor for the competitiveness of the European manufacturing industry. The "Robotics" research axis focuses on the development and promotion of new robot technologies for industrial applications, including a stronger inter-connectivity between components, heavy data-driven approaches to the development of (semi-) autonomous robot systems as well as flexible and intuitive human-robot interaction concepts. Key element in these new production scenarios will be the safety of the human operator in the close proximity of the robot.

## Virtual & Augmented Reality

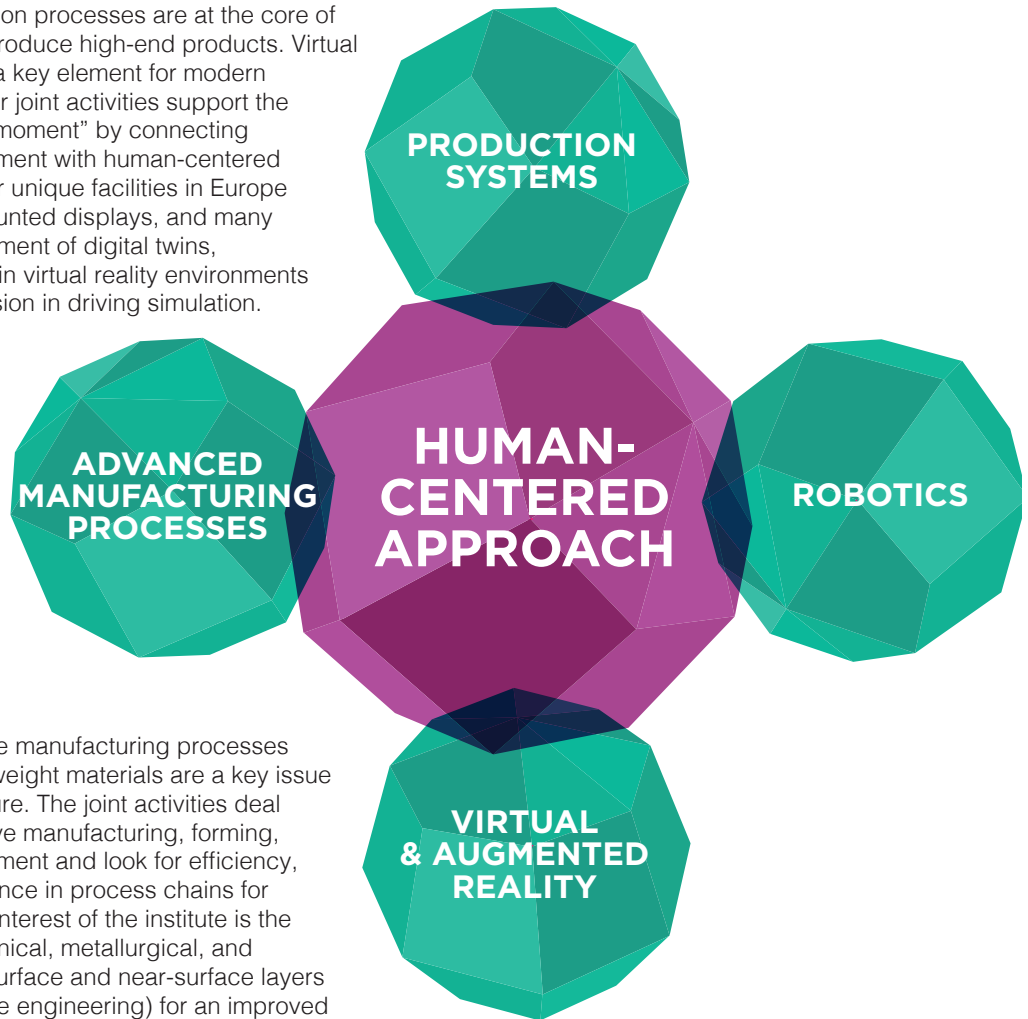
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Fast and targeted innovation processes are at the core of Industry of the Future to produce high-end products. Virtual and augmented reality is a key element for modern working environments. Our joint activities support the “view of the whole at any moment” by connecting product lifecycle management with human-centered design and validation. Our unique facilities in Europe (CAVE systems, head-mounted displays, and many more) enable the development of digital twins, virtual-factory, interaction in virtual reality environments and presence and immersion in driving simulation.

## Advanced Manufacturing Processes

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Advanced and sustainable manufacturing processes adapted to new and lightweight materials are a key issue for the Industry of the Future. The joint activities deal with processes like additive manufacturing, forming, machining, and heat treatment and look for efficiency, robustness, and performance in process chains for complex parts. The focal interest of the institute is the optimization of the mechanical, metallurgical, and topological states of the surface and near-surface layers (also referred to as surface engineering) for an improved functional performance and life of components.



# Statements



## **Dr Armin Azarian**

**ENSAM/KIT + « thèse en cotutelle »  
with SIEMENS**

In 2002, I took part in the double French-German degree program of Arts & Métiers and the KIT. After obtaining a double degree in Engineering, I got interested in pursuing my studies with a French-German doctorate in cotutelle and with an industrial partner. Thanks to the experience gained by previous participants in the joint-degree program, I was able to estimate the difficulties to set up a project in collaboration and to combine the objectives of academic and private partners from both countries. I learnt how to coordinate the different expectations concerning the subject, the calendar and the legal conditions; each country has its own requirements relating to thesis defense. All this already represents a strong added value which guided my professional career towards an international project manager post. Armed with these dual competencies, you are more competitive, and your soft skills set has a broader scope.

While I was studying the French-German double-degree at Arts & Métiers ParisTech and KIT, I got the chance not only to discover different working approaches with regard to engineering topics but also to understand how cultural differences impact collaboration in international teams. Excited by the synergies which can result from cross-cultural activities, I decided, after my graduation in 2013, to join an internationally active company. Thanks to the competences developed during my French-German studies, I am today able to cooperate successfully with my colleagues all over the world and to work as intermediary between teams of different cultural backgrounds.

## **Ann-Christin Walk**

**Cost calculation manager  
at BEUMER Group**





## Jacques Burtscher

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**ENSAM/KIT  
+ doctoral thesis at WBK)**

My name is Jacques Burtscher; my double-diploma studies started in France in 2009 at Arts et Métiers and continued in Germany at KIT in 2011. Since 2013, I have been working as a research associate at KIT, where I am currently working towards a doctoral thesis in parallel to my day-to-day work.

The double-diploma studies prepared me for my present work. I had the chance to get firm theoretical foundations in France and learned to work with creativity. In Germany, I learned to work following strict, but effective methods and I have become more autonomous.



## Dr. Christoph Amma, Fabian Winnen, Marcus Georgi, and Tomt Lenz

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**Founders of KIT start-up Kinemic GmbH**

Some of the first customers of our handsfree interaction software were French companies and we believe there is great potential in increasing the cooperation in this important field. For start-ups in particular, cross-border exchange and joint activities will be very helpful, as young companies often cannot easily establish a foothold in a different market. This is especially true for industry 4.0, as many solutions - like our gesture control software - will be applicable elsewhere and gaining access to them quickly can well be a significant advantage.



## Dr. Thomas Herlan

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**Director HerlanCo GmbH**

Education and research work in a European spirit requires academic research cooperation in the field of Industry of the future between French and German partners. The defined targets, such as human-centered manufacturing, zero-defect manufacturing, mass individualization are current research topics, which should be achieved by cross-border cooperation. And where both sides should contribute their best practice experiences to boost their research in common. Especially robotics, and high-performance manufacturing, such as turning or forming, are major manufacturing techniques for industrial production, which need to be subjected to digital transformation of manufacturing. This know-how is required in education and manufacturing.

The defined targets, the planned research achievements fit well to small and medium-sized enterprises of both countries, or to TIER suppliers, and even to OEMs, independently

of where they are located in Europe. French and German industrial research must enhance European leadership in the field of Industry of the future. Today, we are manufacturing and shipping goods without customs, without borders between our countries, therefore it is important to also cooperate in research without any border.



# Governance

The French-German Institute for “Industry of the Future” consists of more than 50 French and German researchers, including professors, doctoral candidates, and an Advisory Board, composed of 5 members from each institution. In order to ensure collaboration among the 4 research axes, a Scientific Committee has been established, including two responsible scientists per research axis, one from each institution. Steering Committee meetings and workshops are organized every few months, giving us the opportunity to take firm steps towards the fulfillment of the Institute’s objectives.







[www.institute-industry-of-the-future.eu](http://www.institute-industry-of-the-future.eu)

