



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Research Strategy of TU Darmstadt – Executive Summary

As of 24 June 2022

Preliminary Remarks

Beginning in April 2020, participants representing all university status groups and departments worked to develop this research strategy. Following approval of the Senate in May 2021, the Executive Board adopted it and has begun its systematic implementation.

The research strategy is part of TU Darmstadt's overall strategy, comprised of the three pillars of research, teaching and *xchange*, which are accompanied by the cross-cutting themes of *internationalisation*, *diversity*, *digitalisation* and *sustainability*.

Our Vision

At our Technical University, research provides ground-breaking findings and solutions that address today's unanswered questions in addition to generating the ideas of tomorrow. Our research is substantial, sustainably excellent, transformative and attractive for inquiring students and researchers from all over the world. At TU Darmstadt, we clarify fundamental issues and translate scientific findings into technical and social processes and solutions.

Characteristics of our Research

Academic and technical competence, interdisciplinary collaboration, contemporary relevance and credibility are characteristics of our research. We link theory and experiment to address the challenges of the future.

The following features characterise research at TU Darmstadt:

1. A broad portfolio of subjects with strong disciplines, that cooperate intensively across department and subject boundaries.
2. The interconnection of strong basic and application-oriented research and an exchange (*xchange*) with society, business and politics.
3. Above-average success in the competitive acquisition of third-party funding for our research as well as a strong research network, as evidenced by Collaborative Research Centres, Transregional Collaborative Research Centres, EU projects, etc.
4. The presence of excellent, internationally visible researchers whose contributions in their respective scientific communities are recognised through awards as well as through participation in scientific organisations (e.g. German Science Council, selection committee of the ERC Scientific Council).
5. A systematic and early research orientation in all life cycles of academic qualification (degree studies, doctorate, postdoc, junior research group leadership, tenure track professorship) with structured financial and personnel development concepts.
6. A strategic network with scientific institutions in the surrounding area, industrial and international partners, as well as through our Alliance of Rhine-Main Universities (RMU) and the European University Alliance Unite!
7. The unique status of *autonomy* of our university, which offers extensive scopes for action and entails great responsibility, which we are happy to assume.

Our Goals

Our research strategy seeks to achieve the following goals by 2025:

- Goal 1:** We exhibit sustained **excellence** and enhance professional as well as individual scientific quality as the basis of interdisciplinary collaboration.
In order to achieve this goal, we use our autonomy to facilitate and expand **cutting-edge research**. We expand our research community through diversification and internationalisation.
- Goal 2:** We increase the international and national **reputation** and **visibility** of our research performance. We form strong, **international research alliances**.
We achieve this goal by consistently pursuing the path to becoming a European University of Technology. We intensify our scientific cooperation with outstanding partners around the world.
- Goal 3:** We identify and promote forward-looking, relevant **potentials**, topics and ideas.
We pursue this goal in order to remain successful in the long term and to contribute to transformative technologies and ideas for society in the future. We remain agile, flexible and dynamic.
- Goal 4:** We continuously strengthen **exchanges (xchange) with** business, society and politics, which includes a better communication of our expertise.
We acknowledge our responsibility and demand the highest relevance and credibility from our research and its communication.
- Goal 5:** We acknowledge that we are representatives of TU Darmstadt and are aware of our special **TU Spirit**. We strive to maintain and support our institution and its ideals in our relationships with external partners.
The TU Spirit identified in the course of the strategy process contributes significantly to the high satisfaction, motivation and commitment of all TU members. We also want to use this attitude interacting with our partner universities. We actively involve new colleagues as well, who have recently arrived at the TU.
- Goal 6:** We provide excellent support for **early career researchers**.
We implement research-oriented teaching and learning and provide structured support for the qualification of doctoral researchers.
- Goal 7:** We **professionalise** and digitise the organisation and administration of research activities, resulting in dynamic, flexible and proactive promotion of scientific work. We provide structural support for sharing methodological expertise and infrastructure.

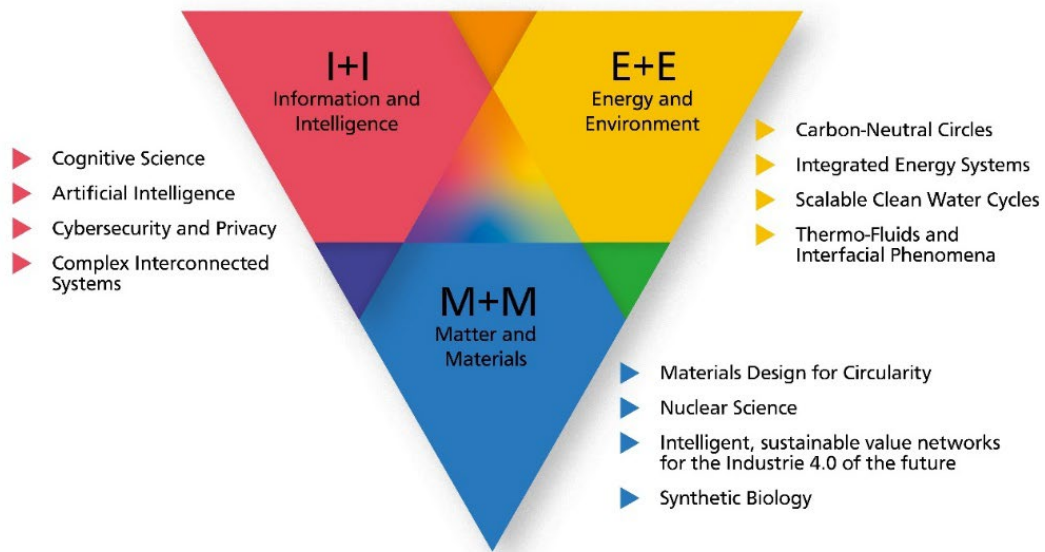
Our Main Research Fields

The focus of research at TU Darmstadt concentrates on three interdisciplinary research fields:

- *Energy and Environment (E+E)*,
- *Information and Intelligence (I+I)*,
- *Matter and Materials (M+M)*.

In these research fields, researchers from different disciplines both form and shape research networks in order to contribute to major societal issues. At the same time, these networks are a place of exchange with society, politics and academia. In addition, each research field contains so-called profile topics. TU Darmstadt is either internationally known for excellent research on these profile topics, demonstrated

e.g. by large collaboration networks, or developing these profile topics for strategic reasons. Research fields and profile topics contribute significantly to achieving the above-mentioned goals.



Research Fields and Profile Topics

The research field *Energy and Environment (E+E)* encompasses an interdisciplinary commitment to modern concepts and technologies for energy conversion and storage, environmentally friendly processes, efficient use of resources and climate-neutral mobility. For example, our researchers investigate hydrogen and iron as energy carriers, water as one of our most important resources, energy-efficient cooling systems, cross-sectoral heat and power grids as well as on climate-neutral transportation.

The research field *Information and Intelligence (I+I)* is dedicated to the intelligent and responsible use of information and knowledge, which is of very fundamental importance in our digital and global age. Here, researchers from various disciplines address, for example, artificial intelligence, intelligent and resilient data networks, IT security, protection of privacy, autonomous robotic systems and automation for tomorrow's economy, as well as patterns of human thought and action that are so important for our technical developments.

The research field *Matter and Materials (M + M)* aims at fundamentally understanding matter as well as developing materials that enable sustainability and advancement in various application areas. Our researchers combine findings from basic research studies and different disciplines with applications for energy conversion, electronics and sensor technology as well as synthetic biology. In doing so, they strive to avoid critical raw materials and to establish a sustainable supply chain from the beginning as they consider material selection, production, use, and end-of-use recycling.