

# TU Dresden: A “Full-Range“ University of Technology

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Rector

Panel: Positioning, Roles and Functions of Universities of Technology  
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# Global Challenges of the 21<sup>st</sup> Century

Humankind is facing **Challenges** in several areas:

- Climate Crisis
- Finitude of Natural Resources
- Digitalization, Artificial Intelligence
- Demographic challenge, Labor Force Challenge
- ...

Addressing global challenges requires **comprehensive, transdisciplinary collaborations** within universities and between.

# Epistemological Frontiers in the Sciences and in Technology

- Enormous progress within disciplines
- Enormous progress (and fast turnover) in observation, measurement and experimentation equipment
- Enormous progress in handling large amounts of data
- More and more complexity is revealed that requires multiple disciplines
- **Academic structures** and **financial resources** need to follow suit

# Academic Structures: Types of Universities



## Universities of Technology

- Traditionally no comprehensive range of disciplines
- Some perspectives needed for Global Challenges are lacking (e.g. Humanities)
- Interdisciplinarity and transdisciplinarity within the institution is limited



## “Technische Volluniversität” (full-range University of Technology)

- Ideally suited to face Global Challenges comprehensively
- Ideally suited to push epistemological frontiers
- Ideally suited to tackle innovation and productivity



## “Volluniversitäten” (traditional, research-intensive Universities)

- lat. *universitas litterarum*, include the subject areas of humanities, mathematics, law and medicine
- Usually don't have a focus on technological subjects and research areas
- Also lacking critical disciplinary input

# History as Launch Pad for a Full-Range University of Technology

- 1828 founded as a technical school
- 1890 renamed “Royal Saxon Technical College” (TH)
- 1945 largely destroyed during World War II
- 1946 reopening of TH Dresden
- 1961 status of a University of Technology (TU)
- 1990 new faculties, comprehensive range of disciplines**
- 2012 University of Excellence (successfully renewed in 2019)



# German Research Landscape: Financial Resources

- State Universities (Federal States)
- Non-university Research Associations (National Level)
  - Max Planck Society
  - Helmholtz Association
  - Leibniz Association
  - Fraunhofer Society

# DRESDEN-concept

University  
Max Planck  
Helmholtz  
Leibniz  
Fraunhofer  
Museums &  
Cultural  
Institutions



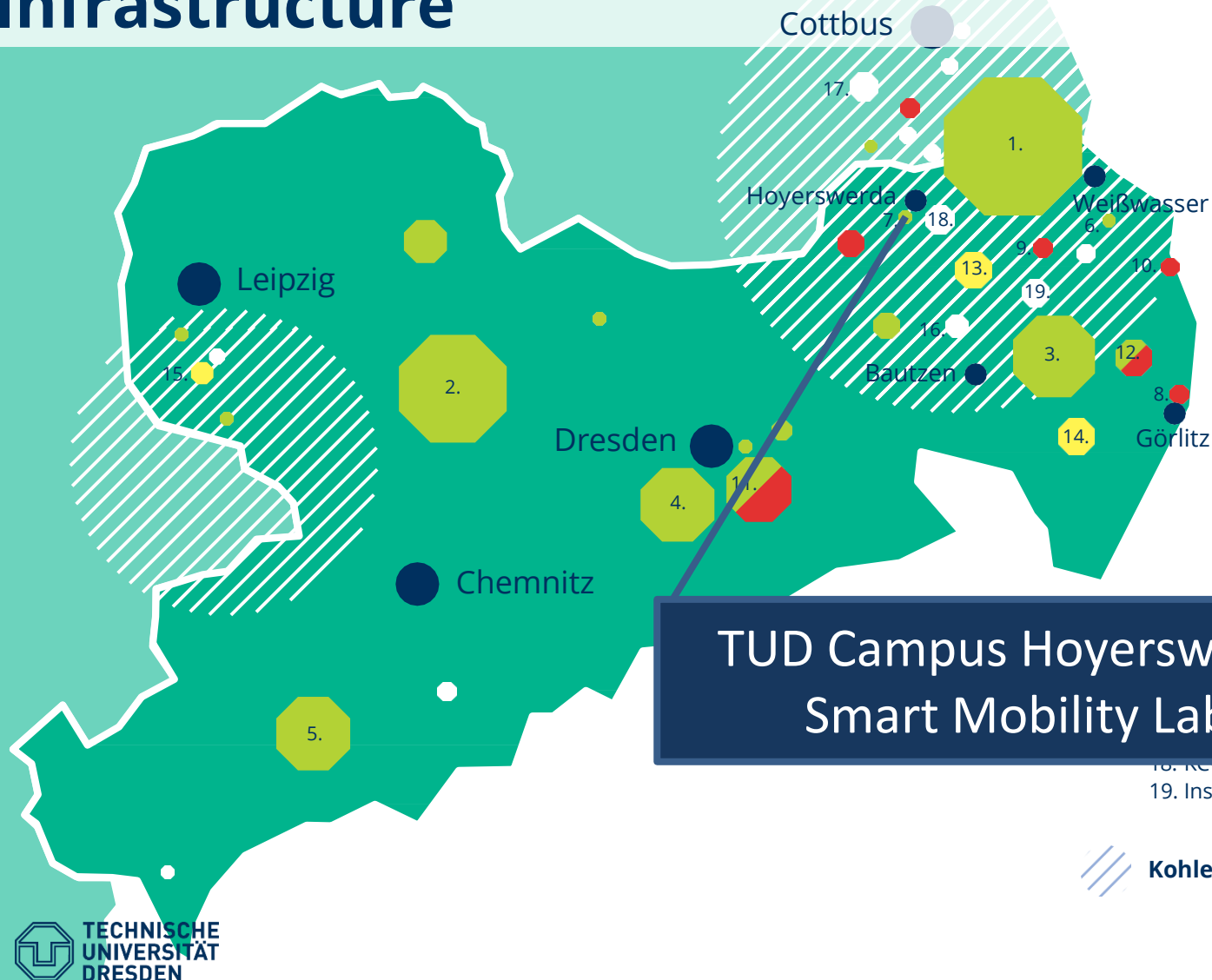
# Science and Innovation Campus

33 Partners  
(approx. 12,000 researchers)

1  TECHNISCHE UNIVERSITÄT DRESDEN	8  DZNE Deutsches Zentrum für Neurodegenerative Erkrankungen in der Helmholtz-Gemeinschaft	15  CBG Max Planck Institute of Molecular Cell Biology and Genetics	22  barkhausen institut	28  TECHNISCHE SAMMLUNGEN DRESDEN
2  Universitätsklinikum Carl Gustav Carus DIE DRESDNER.	9  HZDR HELMHOLTZ ZENTRUM DRESDEN ROSSENDORF	16  mpipks	23  HTW HOCHSCHULE FÜR TECHNIK UND WIRTSCHAFT DRESDEN UNIVERSITY OF APPLIED SCIENCES	29  Fraunhofer IWU
3  Fraunhofer IPMS	10  Deutsches Zentrum für Luft- und Raumfahrt	17  MAX-PLANCK-INSTITUT FÜR CHEMISCHE PHYSIK FESTER STOFFE	24  LANDESAMT FÜR ARCHÄOLOGIE   Freistaat SACHSEN	30  Fraunhofer IVV
4  Fraunhofer FEP	11  Leibniz-Institut für ökologische Raumentwicklung	18  MILITÄR HISTORISCHES MUSEUM Dresden	25  Fraunhofer IZM	31  UNITED NATIONS UNIVERSITY UNU-FLORES Institute for Integrated Management of Material Fluxes and of Resources
5  Fraunhofer IKTS	12  ipf Leibniz-Institut für Polymerforschung Dresden	19  SLUB Wir führen Wissen.	26  Fraunhofer IFAM	32  PTS FIBRE based solutions
6  Fraunhofer IWS	13  SENCKENBERG world of biodiversity	20  Staatliche Kunstsammlungen Dresden	27  Hochschule für Bildende Künste Dresden	33  HAIT HANSA-LABOR-INSTITUT für Nanotechnologie e.V. an der TU Dresden
7  Fraunhofer IVI	14  IFW	21  DEUTSCHES HYGIENE-MUSEUM DRESDEN		

# Structural Change in the Lausitz Coal Region

## Launch Pad for Unique Research Infrastructure



- Projects funded by the "Bund"**
1. 5GFOLA - HP: 5G Lab Forschungsfeld Lausitz
  2. Landnetz - Kommunikations- & Cloudnetz
  3. 5G-Insel-Entwicklung
  4. ecoKI: Forschungs- & Technologieplattform
  5. BAUEN 4.0 - Automatisierung & 5G Vernetzung
  6. ZUKUNFTALTER
  7. digiBauHoy - Digitale Baustelle

- Projects funded by the "Land"**
8. TUD-Zweigcampus zu automatisierter Wasserstoffmobilität
  9. SZ Videoproduktion GFZ Lausitz
  10. CircEcon: FZ f. Kreislauf- & Bioökonomie

- Projects funded by "Bund / Land"**
11. 5G Campus - Campusnetzwerke
  12. PANOS - Parkinson Netzwerk Ostsachsen

- Großforschungszentren (Konzeptphase)**
13. Lab - Lausitz Art of Building
  14. Deutsches Zentrum für Astrophysik (DZA)
  15. CLAIRE (Center for Climate Action and Innovation)

**TUD Campus Hoyerswerda  
Smart Mobility Lab**

16. REW-GmbH - Innovative Fahrzeuge Lausitz
17. Inst. Binnenschifffahrt - Teich Lausitz
18. REW-GmbH - Innovative Fahrzeuge Lausitz
19. Inst. Binnenschifffahrt - Teich Lausitz

**Kohlereviere**



# University Alliances Europe: Widening the Range

Co-funded by the  
Erasmus+ Programme  
of the European Union



European **U**niversities  
Transforming  
to an  
**O**pen, **I**nclusive **A**cademy for  
2050 (EUTOPIA)

## Vision

'EUTOPIA is a challenge-led,  
student-centered,  
place-based, inclusive alliance  
of entrepreneurial,  
change-focused universities

### Founding members



### New members 16. Sept 2021



# Our vision

## University of Excellence for the 21<sup>st</sup> century

We strive to make TU Dresden a **globally oriented** and **regionally anchored** University of Excellence for the 21<sup>st</sup> century:

A full-range university of technology that

- **contributes innovative solutions** to solving global challenges,
- achieves high visibility worldwide,
- and consistently ranks among the top German universities.



# TUD among Top 5 of Excellence Universities in Germany

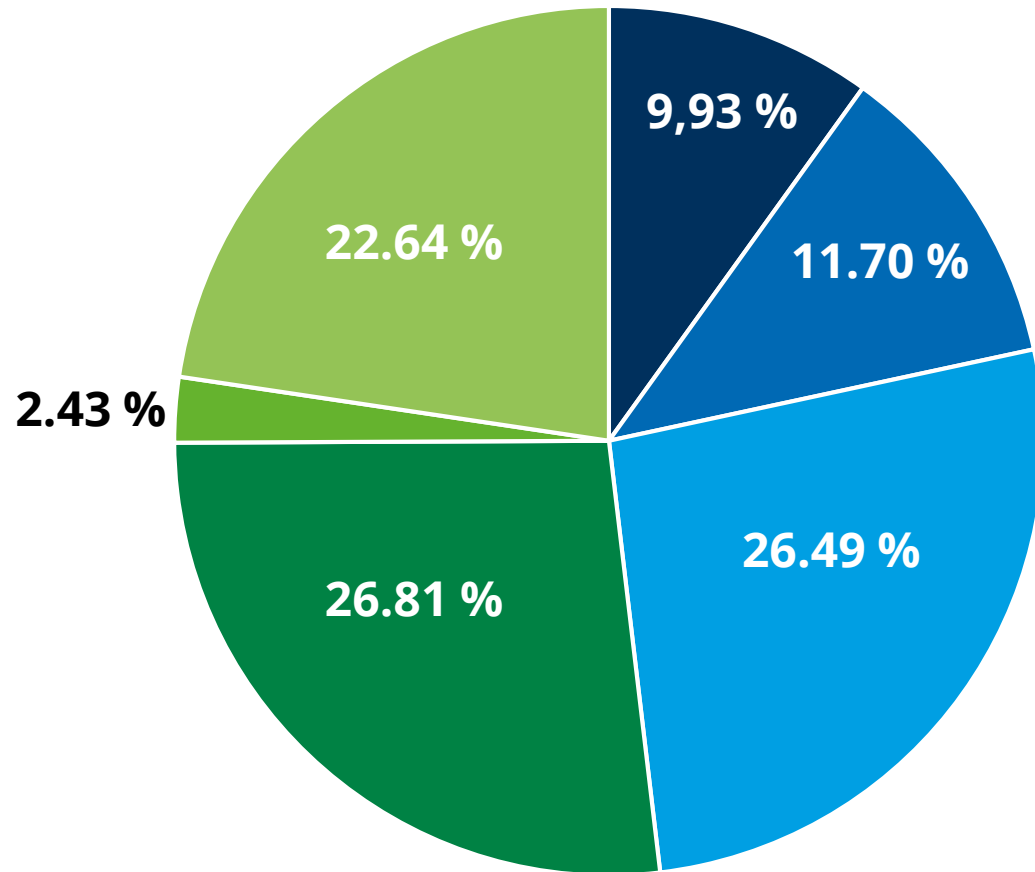
- Students: **30,600** + Doctoral Students: ca. **6,000** (20% international)  
International students: **5,325** from **130** countries (**18 %**)
- Employees: ca. **8,800** (ca. 5,000 central; ca: 3,800 third- party funding)  
of which professors: **600 (22% female)**
- Overall budget: approx. **709 Mio EUR** of which third-party funding:  
ca. **310 mio. € (of which 69 Mio € DFG, 9.5 Mio € EXU)**  
**(45% third party funding)**
- **128** degree programs
- **97** patents per year
- **20** spin-off companies per year

*Reference Point: 08/2022*

# TU Dresden Structure: 17 Faculties | 5 Schools

<b>Sciences (109)</b>	<b>Civil and Environmental Engineering (138)</b>	<b>Engineering Sciences (113)</b>	<b>Humanities and Social Sciences (98)</b>	<b>Medicine (106)</b>
Biology Chemistry Mathematics Physics Psychology	Architecture Civil Engineering Environmental Sciences Transportation and Traffic Science Business and Economics	Electrical and Computer Engineering Computer Science Mechanical Science and Engineering	Education Linguistics, Literature and Cultural Studies Arts, Humanities and Social Science (incl. Law)	Medicine

# Student Numbers By School (11.2021)



- Medicine
- Sciences
- Engineering Sciences
- Civil Engineering and Environmental Science
- Other
- Humanities and Social Science

**Total: 30.588**

# Research Priority Areas of Excellence and Potential



## Health Sciences, Biomedicine and Bioengineering

- Biophysics and Bioengineering
- Regenerative Therapies
- Oncology
- Metabolic Diseases

Neuroscience



## Information Technology and Microelectronics

- Micro- and Nanoelectronics
- Communication

Data-Intensive Science



## Materials Science and Engineering

- Smart Materials and Structures
- Circular Economy



## Energy, Mobility and Environment

Water Research  
Automated and Networked Mobility

CO2 Neutral Energy



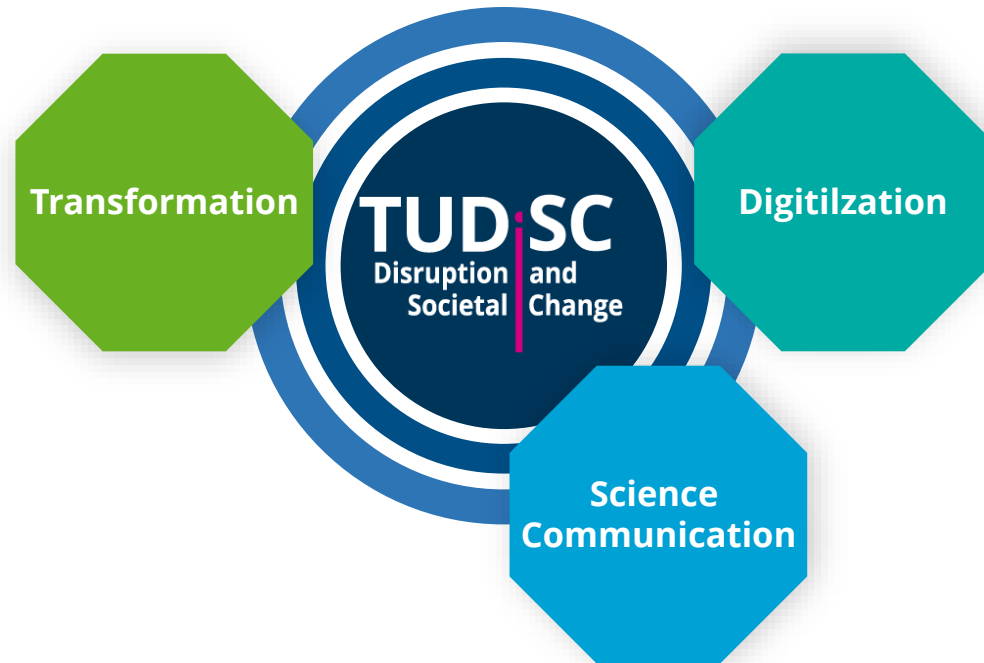
## Culture and Societal Change

Societal Disruption

# Digitalization for and with Humans: Highly Interdisciplinary Field



# TUDiSC – Disruption and Societal Change Center



Interdisciplinary Collaboration with a focus on research of disruption:

**Engineering, Computer Science, Data Science, Nat. Sciences, Humanities, Social Science, Behavioral Science**

## Projects (Selection)

### TPM

Transformative  
Place-Making for Uncertain  
Futures

### .DOT

The Disruptivity of the  
Others in Transformations

### HumGlobal

Many Moving Parts:  
Continuity, Disruption, and  
Change in Global  
Humanitarian Aid Relations

### Disrupt!Research

Collaboration under  
Conditions of Disruption

### DiaDiK

Digitization as Disruption  
of Knowledge Systems:  
Open(ing) Knowledge

### DIPCY

Disruptions of Cyber  
Privacy

### DESIGNATE

Disruption in the Internet:  
More Sovereignty in the  
face of Deceptive  
Technologies

### Digital disruption and disinformation

challenges to institutional  
legitimacy and  
trustworthiness



# Clusters of Excellence (2019 – 2026)



**Electrical Eng. | Behavioral Science |  
Medical Science | Material Science**

CeTI aims to expedite the efficient cooperation between humans and machines. A future application is the co-working of humans and machines with mutual learning. This endeavor requires both innovative communication technologies in real time as well as an understanding of the human body and its reactions.

**Speaker: Prof. Frank Fitzek**



**Biology | Physics | Chemistry |  
Data Science**

The cluster aims to investigate the fundamental issues in cell and developmental biology and initiate a paradigm shift to create understanding of the underlying biological processes of life as complex physical phenomena.

**Speaker: Prof. Stephan Grill**



**Physics | Material Science |  
Chemistry | Data Science**

The cluster places emphasis on quantum mechanisms on the atomic scale, which, in conjunction with topological physics and chemical and physical complexities, reveals previously unprecedented properties and phenomena. This proposal was submitted in cooperation with the University of Würzburg.

**Speaker: Prof. Matthias Vojta**

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