

Sustainable Circular Economy

Research at the Technical University Cologne

Prof. Dr. Christian Wolf



EUROPÄISCHE UNION
Investition in unsere Zukunft
Europäischer Fonds
für regionale Entwicklung

Ministerium für Innovation,
Wissenschaft und Forschung
des Landes Nordrhein-Westfalen



Ministerium für Bauen, Wohnen,
Stadtentwicklung und Verkehr
des Landes Nordrhein-Westfalen



Ministerium für Klimaschutz, Umwelt,
Landwirtschaft, Natur- und Verbraucherschutz
des Landes Nordrhein-Westfalen



Students at TH Köln	27,000
Freshman students per year¹	6,500
International students	4,400
▪ Nationalities	120
▪ Students from Mozambique in Bachelor's programs	0
▪ Students from Mozambique in Master's programs	0
PhD students	180
Degree Programs	100
▪ Bachelor	50
▪ Master	50
Faculties	12
▪ Locations	5
Members of Staff	2,000
▪ Professors	440
Budget volume in € million (fiscal year 2020)	175
▪ Research and external funds	22

Campus
Südstadt



Campus
Deutz



Campus
Gummersbach



Campus
Leverkusen





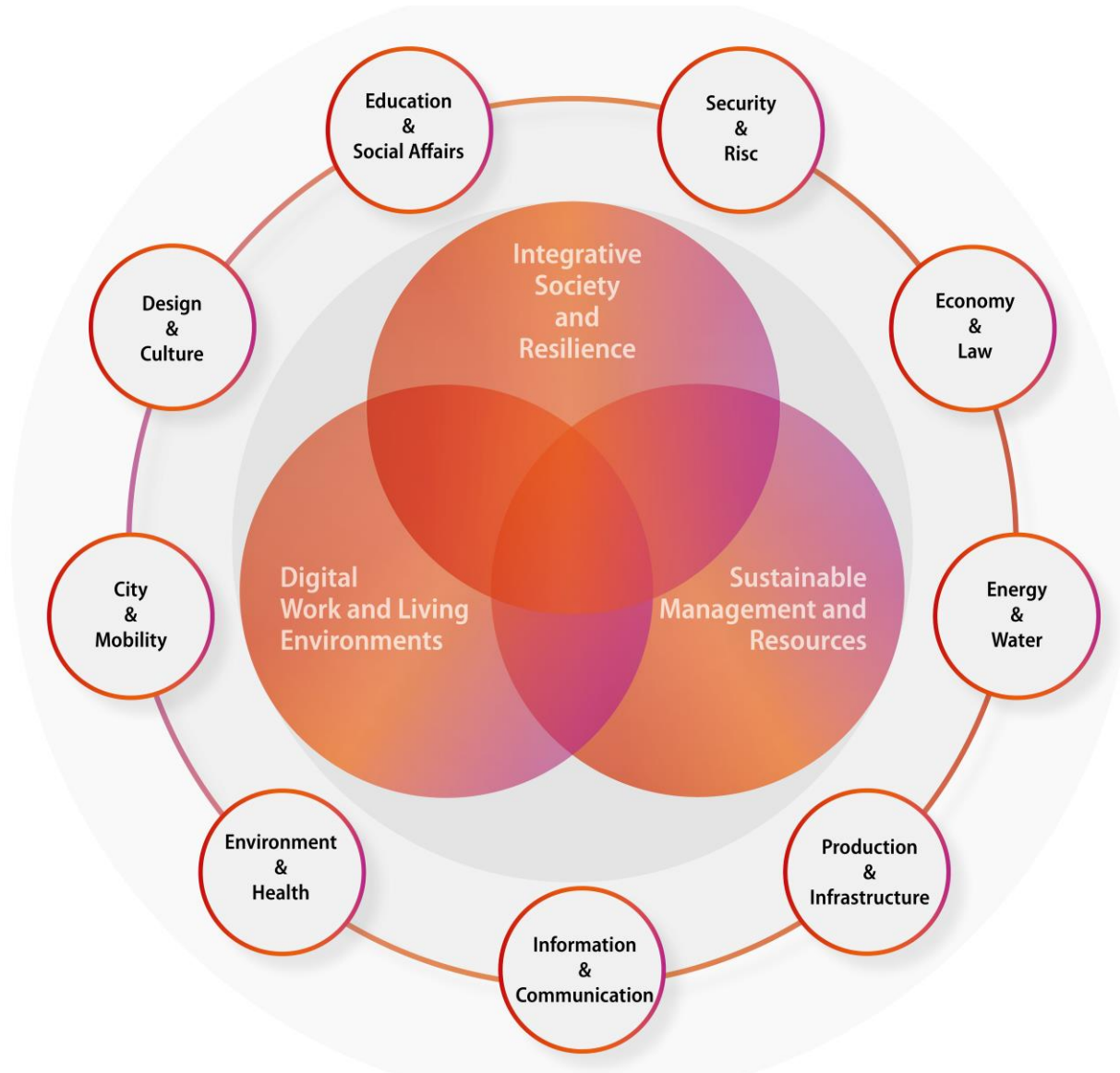
Research-based learning
for all students



Application-oriented and
interdisciplinary research



Graduate Center –
Promotion of early-career
researchers





Prof. Dr. Stefan Herzig
President of TH Köln



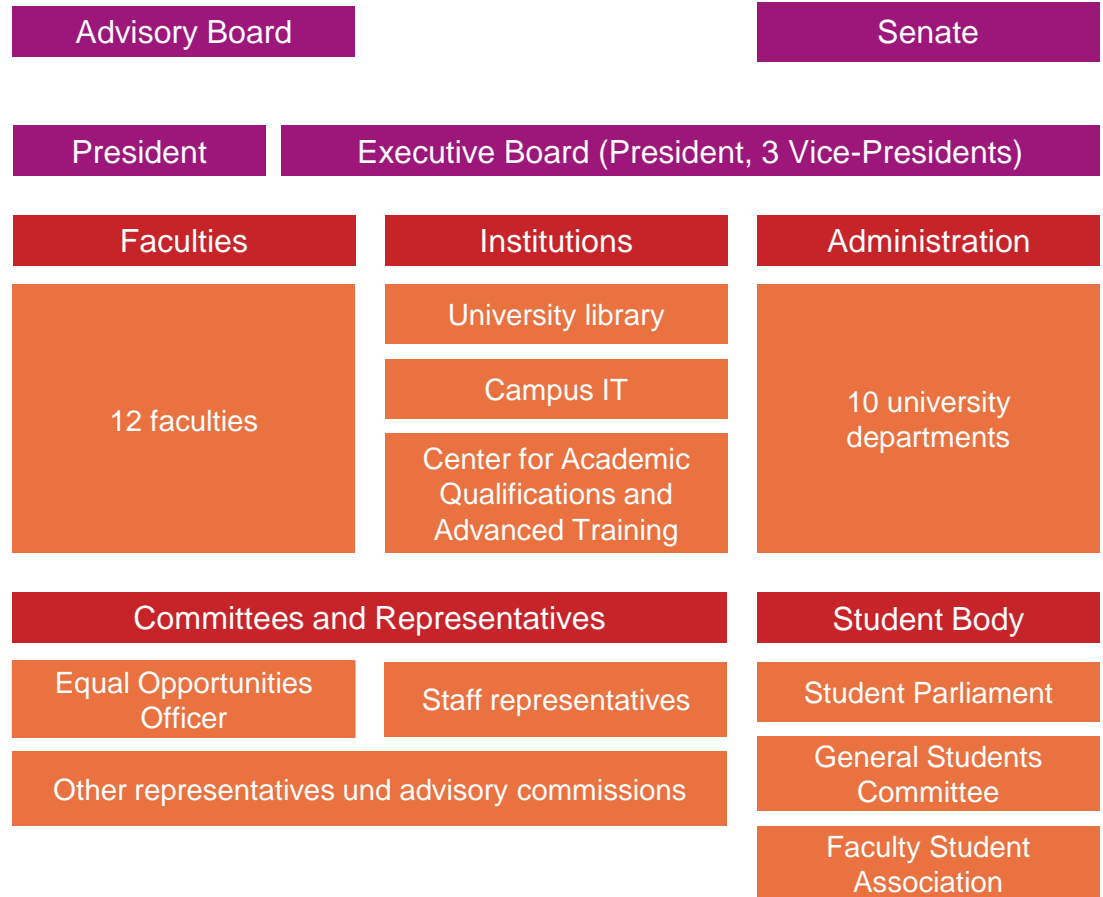
Prof. Dr. Sylvia Heuchemer
Vice President for Academic Affairs



Prof. Dr. Klaus Becker
Vice President for Research and Knowledge Transfer



Dr. Ursula Löffler
Vice President for Financial Affairs and Human Resources





4,400+

International students

→ 120+

Countries

400

Exchange students p.a.

570

Foreign mobilities

13

International degree programs

368

Partner universities worldwide

€ 4 Mio +

For international programs and projects

International networking via consortia:

UAS7, DHIK, GJU, VGU

Liaison Offices:

- New York City (UAS7)
- Beijing (with the University of Cologne)

Scientific Employees

- 10 researchers
- 5 students (B.Sc. and M.Sc.)



All employees are funded by European and National research projects:

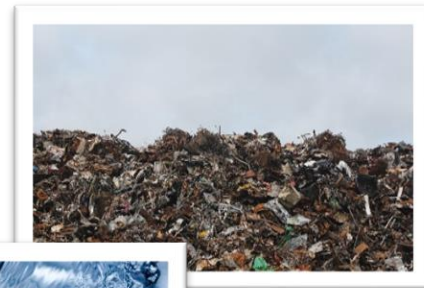
- We write research proposals together with industry.
- Strong focus on applied research.
- They learn to be responsible and self-reliant and have direct contact to companies.

Main research areas are:

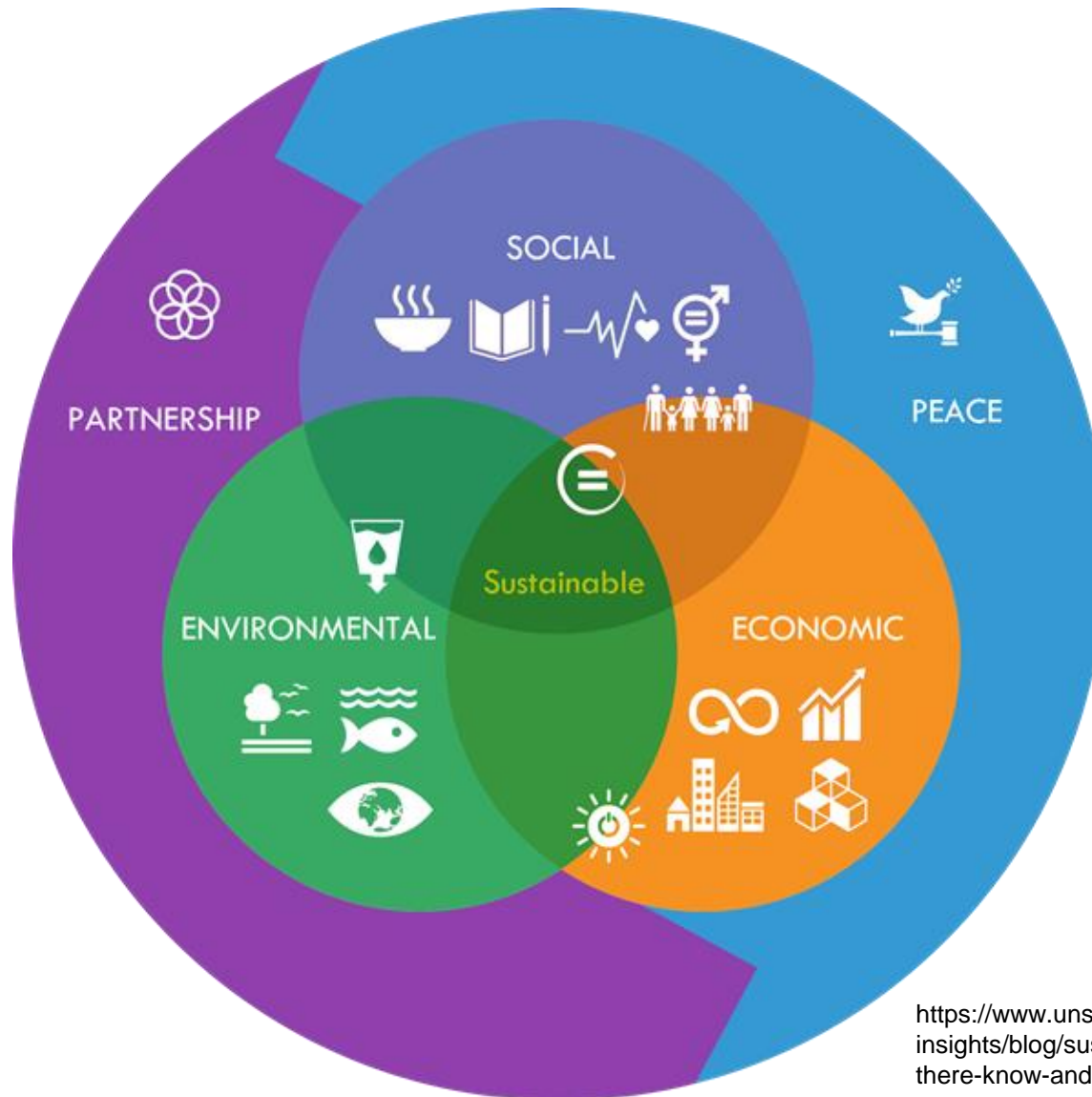
- Industry 4.0, advanced process optimization and control
- sensor technology, energy savings, Data analysis (ML, Big Data)

Application areas are:

- Water and wastewater industry
- Waste management and recycling







<https://www.unssc.org/news-and-insights/blog/sustainable-development-what-there-know-and-why-should-we-care/>



Place for Learning

Learning close to reality

Kindergarden
Primary and secondary
school A-levels

Place for Research

Applied Research on
Resource Management
Optimization

European Lecture and
Research Center

Bergisches Energy Competence Center

Showroom for local industry
„House of the Future“

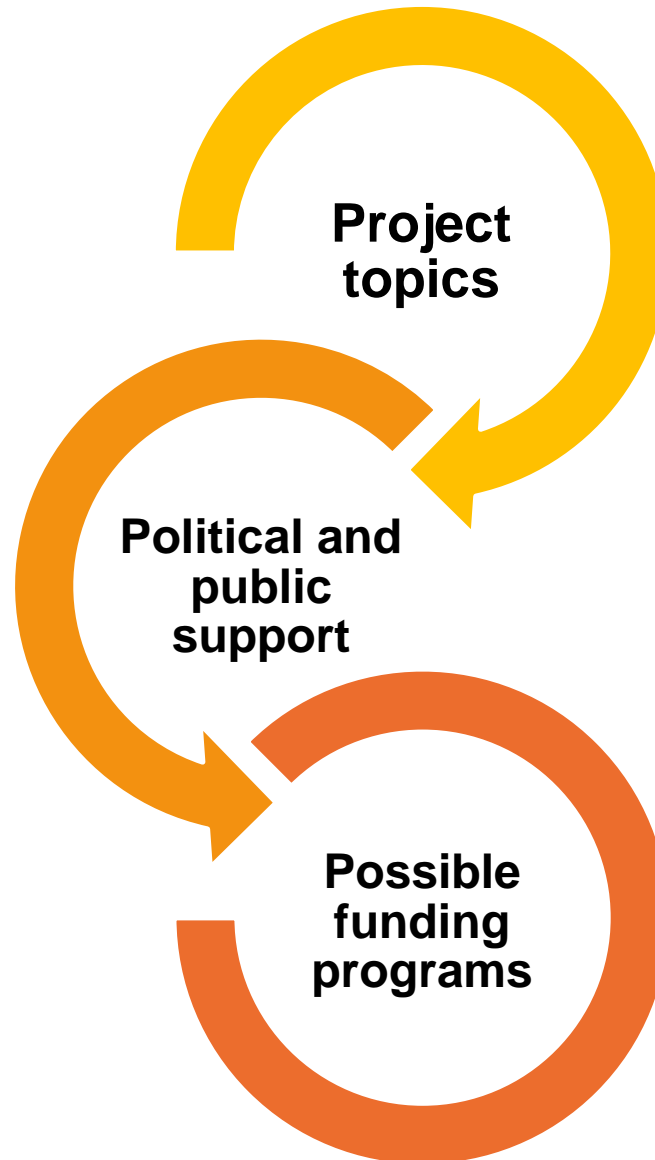
Superordinate Concept: Knowledge Transfer – Lifelong learning

Sustainable Business Park, Leisure and Culture

- Site: Leppe landfill (111 acres)
(ca. 30km East of Cologne)
- 2004 – End of landfilling of organic waste (household waste)
- until 31. Dec. 2022 – landfilling of grate ash from incineration and mineral waste (40.000m³/a)
- Treatment of 42.000 t of organic municipal solid waste (OMSW) in a biogas plant with subsequent composting facilities.
- Industrial full-scale plants ofr leachate treatment and power generation from landfill gas.







Inter- and transdisciplinary joint expert groups with members from research and industry





Federal State of
NRW
Regionale 2010

National Funding



European Funding
Horizon2020
Horizon Europe



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Showroom for local industry
„House of the Future“

Superordinate Concept: Knowledge Transfer – Lifelong learning

Sustainable Business Park, Leisure and Culture

Classrooms and programs at the landfill focusing on practice-oriented knowledge transfer

Close cooperation with:

- German Education Network
- Public Transportation Services

Topics are:

- Treatment and valorization of residual waste, resource efficiency, wood as a resource and renewable energy

Projects:

- Green Classroom
- Little Researcher Bus for school visits
- “Home of little researcher” program for kindergarden and primary schools



Place for Learning Some impressions





Natural Resources
Research Institute



UNIVERSITY OF MINNESOTA DULUTH
Driven to Discover



Kyrgyz State
Technical University



Research cooperation
:metabolon



Technology
Arts Sciences
TH Köln



industry

resources

pretreatment

utilisation

products

agriculture
&
forestry

Energy plants
miscanthus
short rotation coppice
forest residues
plant roots, small wood
by-products
sugar beets processing

composites
thermal insulation composite
systems

waste
manage-
ment

organic municipal waste
green waste, waste wood,
biowaste, screenings
**secondary streams from
landfill operation**
landfill gas
leachate water

water
economy

sewage sludge
process water

pretreatment

Process monitoring and automation

combustion

gasification

anaerobic
digestion (biogas)

hydrothermal
carbonisation

pyrolysis

wastewater
treatment

electricity

heat

fuels

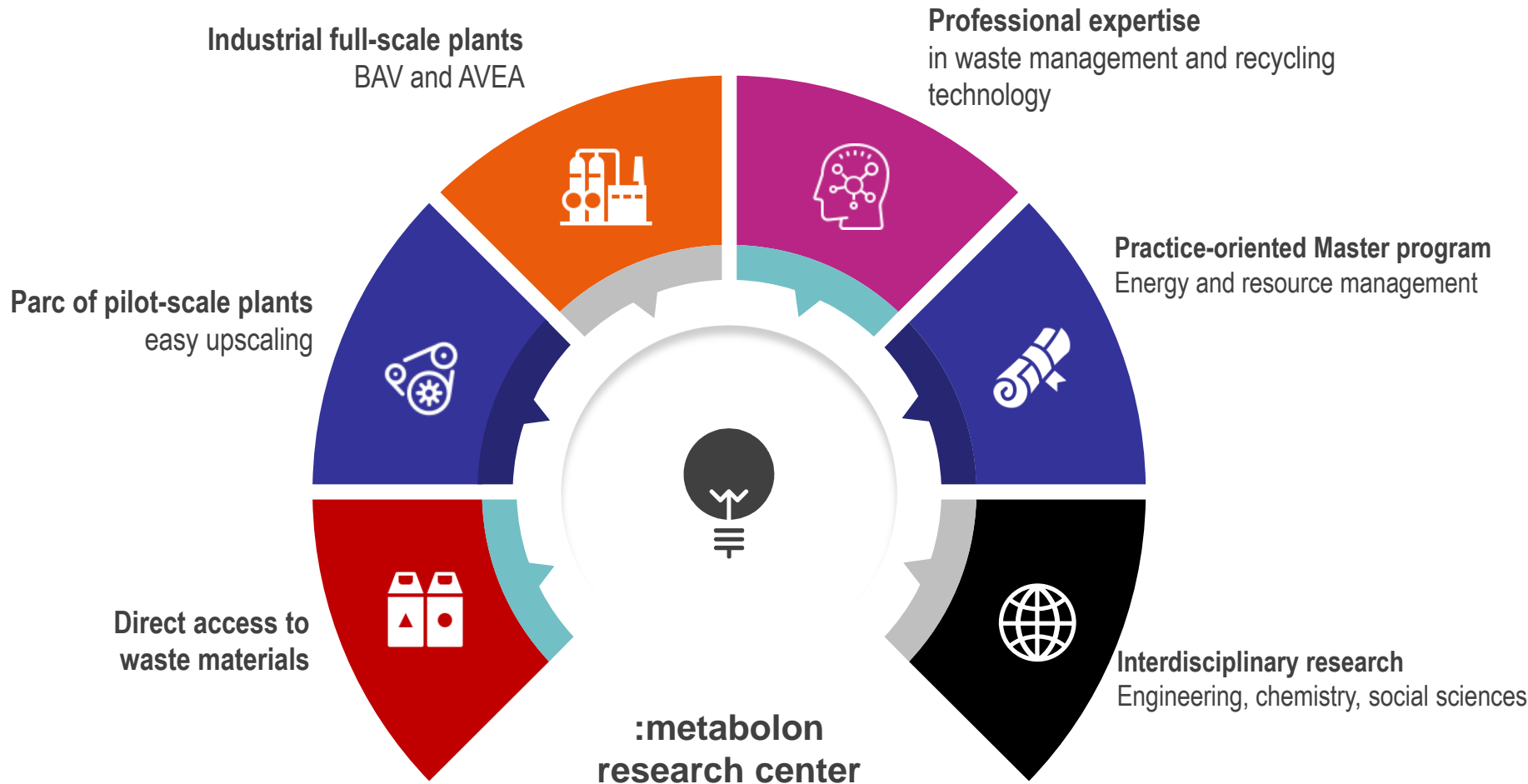
chemical raw
materials

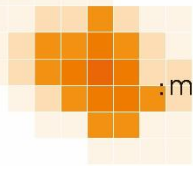
coke products

metallic
recyclables

secondary raw
materials

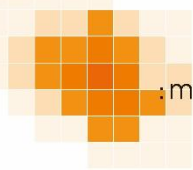
balancing, LCA, profitability











Buderus

VIESMANN

climate of innovation



SOLARFOCUS
macht unabhängig



döpik
Umwelttechnik

BUSCH-JAEGER

BRÖTJE
HEIZUNG

BOSCH

Heizsysteme
für Holz
hdg-bavaria.com
Komfortabel
heizen. Mit Holz!

Schröder
ABGASTECHNOLOGIE

thermofer
HEIZUNG DER ZUKUNFT

GAYKO
BESSERE FENSTER UND TÜREN



wilo

Naturwaren
biol. Baustoffe
Graen

EGL Lieberhausen e.G.

avea

EFFIZIENZ
AGENTUR
NRW
efa+

VALLOX
Komfortlüftungs-Systeme

HEINEMANN
Die Frischluftspezialisten

VALLOFLEX
Flexible Luftverteil-Systeme

allaway
Zentralstaubsaug-Systeme



Natürlich Wärme

EnergieAgentur.NRW



JUNKERS Wärme fürs Leben

Miscanthus
Sieverdingbeck

Lehmbär
Lehmarbeiten aller Art

regenerative
generation

Landesbetrieb Wald und Holz
Nordrhein-Westfalen

Regionalforstamt
Bergisches Land







Cooperation with regional partners

- Trial-Parcours
- Segway, cross golf, lama trekking, mountain bike park
- Bee colonies
- Cultural receptions
 - Concert series „music meets :metabolon“
 - Literature readings, art installations



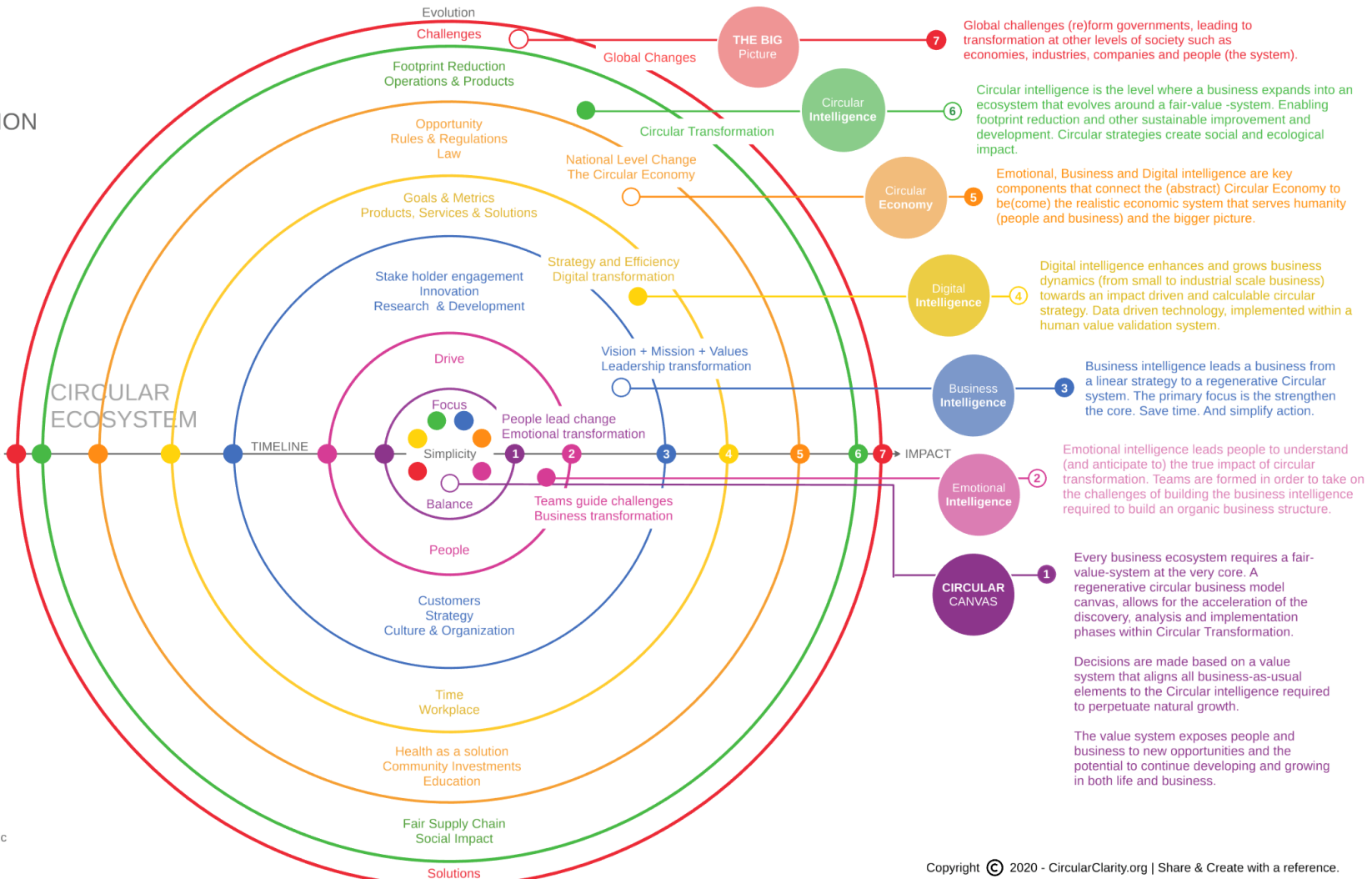




Circular Ecosystems lead to creating the Circular intelligence needed to create influence.



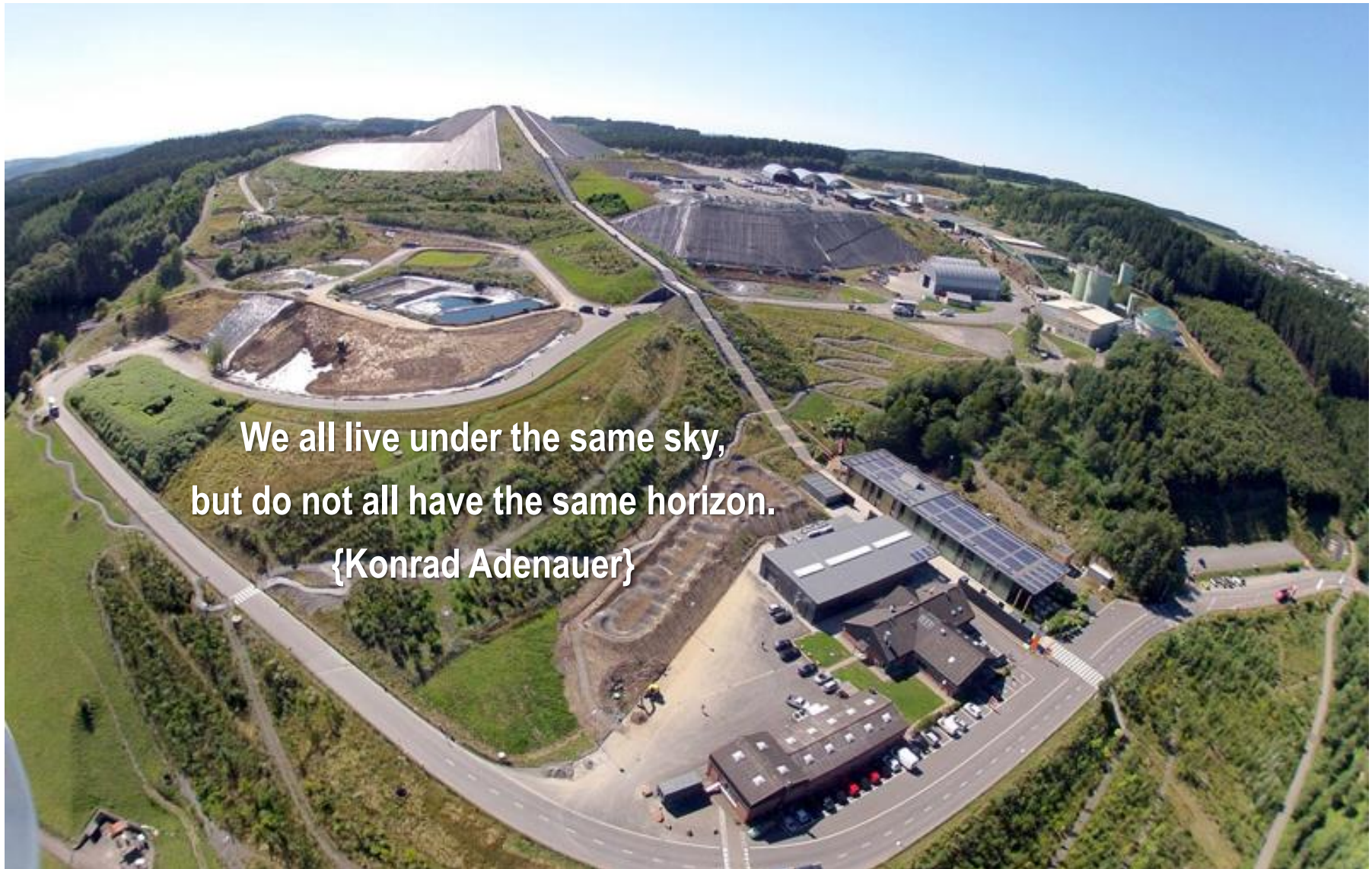
Clarity is the essence of a fair-value-system that enables organic business development.



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Thank you!

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We all live under the same sky,
but do not all have the same horizon.
{Konrad Adenauer}