



ENERGY TURNS – BACK TO FUTURE?

UFMG BELO HORIZONTE

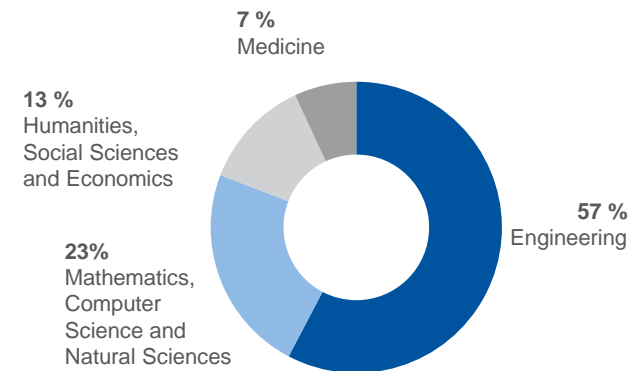
Univ.-Prof. Dr. phil. Paul Thomes
www.wisotech@rwth-aachen.de



RWTH Aachen University (Germany)

The integrated interdisciplinary university of technology
Thinking the Future

- Founded in 1870
- About 45.000 students (20% international), 550 professors
- Among the best German universities (Member of „Excellence Initiative“ since 2007)
- Strong in third-party funding
- Close contacts to industry and business
- € 948.0 million budget p.a.





Profile Areas:

- Computational Science & Engineering
- **Energy**, Chemical & Process Engineering
- Information & Communication Technology
- Material Science & Technology
- Molecular Science & Engineering
- **Mobility** & Transport Engineering
- Production Engineering



Interdisciplinary Center as a unique selling-point



- From interdisciplinary project house to new **Department for Society, Technology, and Human Factors** in Faculty of Arts and Humanities:
 - Philosophy of Science and Technology
 - Applied Ethics and Ethics of Technology
 - Technology, Economy and Society
 - Individual and Technology
 - Computational Social Sciences
- Increase holistic reflexion and critical thinking on innovation processes
- Support a responsible approach to research and innovation

**innovative approach:
Living Lab**

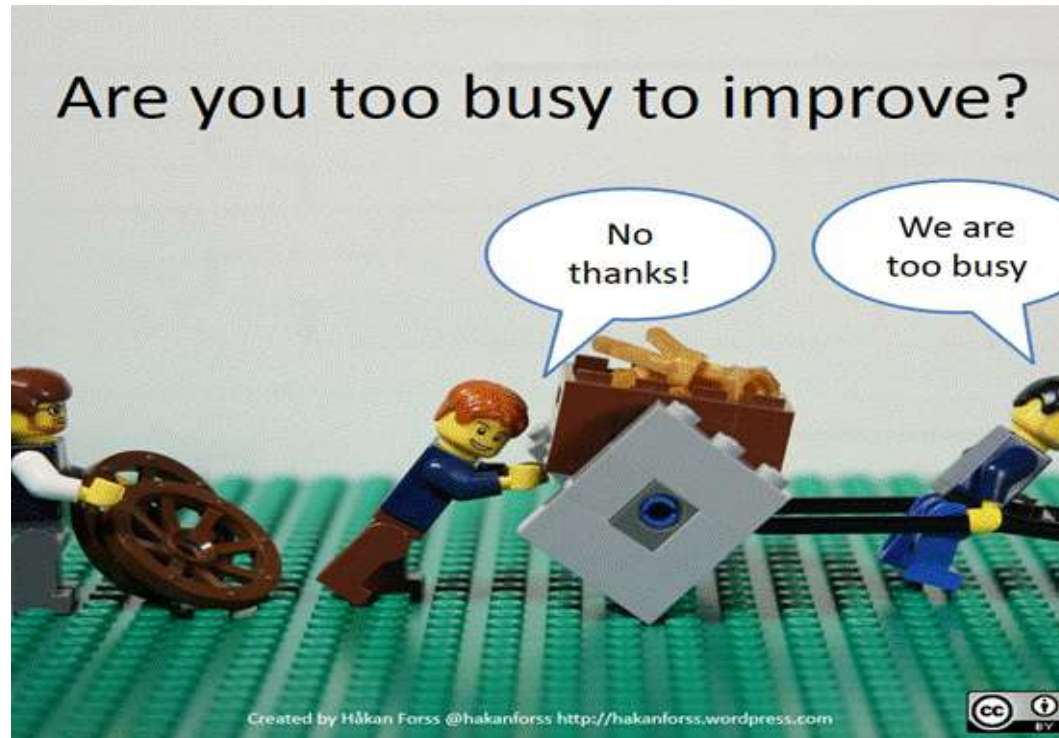
School of Business and Economics

- Founded in 1986
- 26 Full Professors & 4 Junior Professors
- Third-party funding 2017: 8.8 million €
- About 60 exchange cooperation partners worldwide
- About 8,000 students including the Business Administration and Business Engineering programs
- About 350 graduations (25-30 doctoral degrees) p.a.

PT Transforming past into future

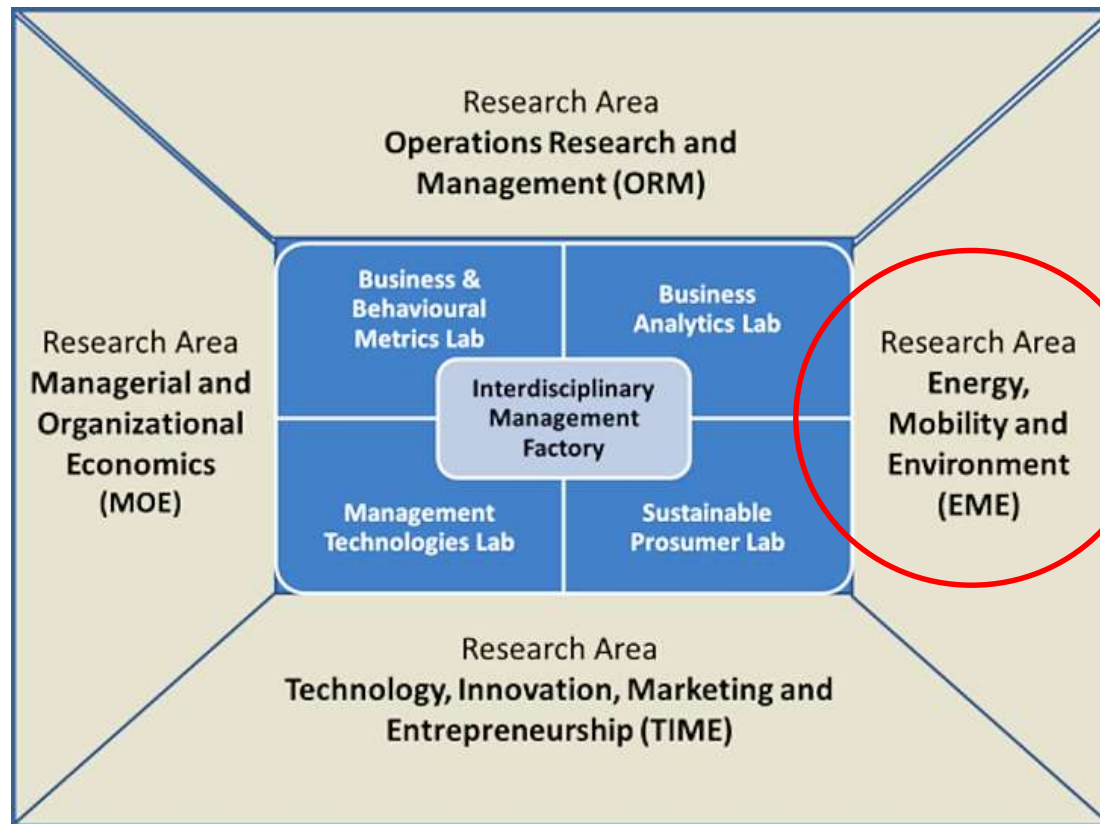


Out of the box ... and beyond – change as challenge



- Creativity vs. rat race dynamics vs. status quo
Wanted: critical heads all over the world
(W. v. Humboldt)

Research Areas & Labs

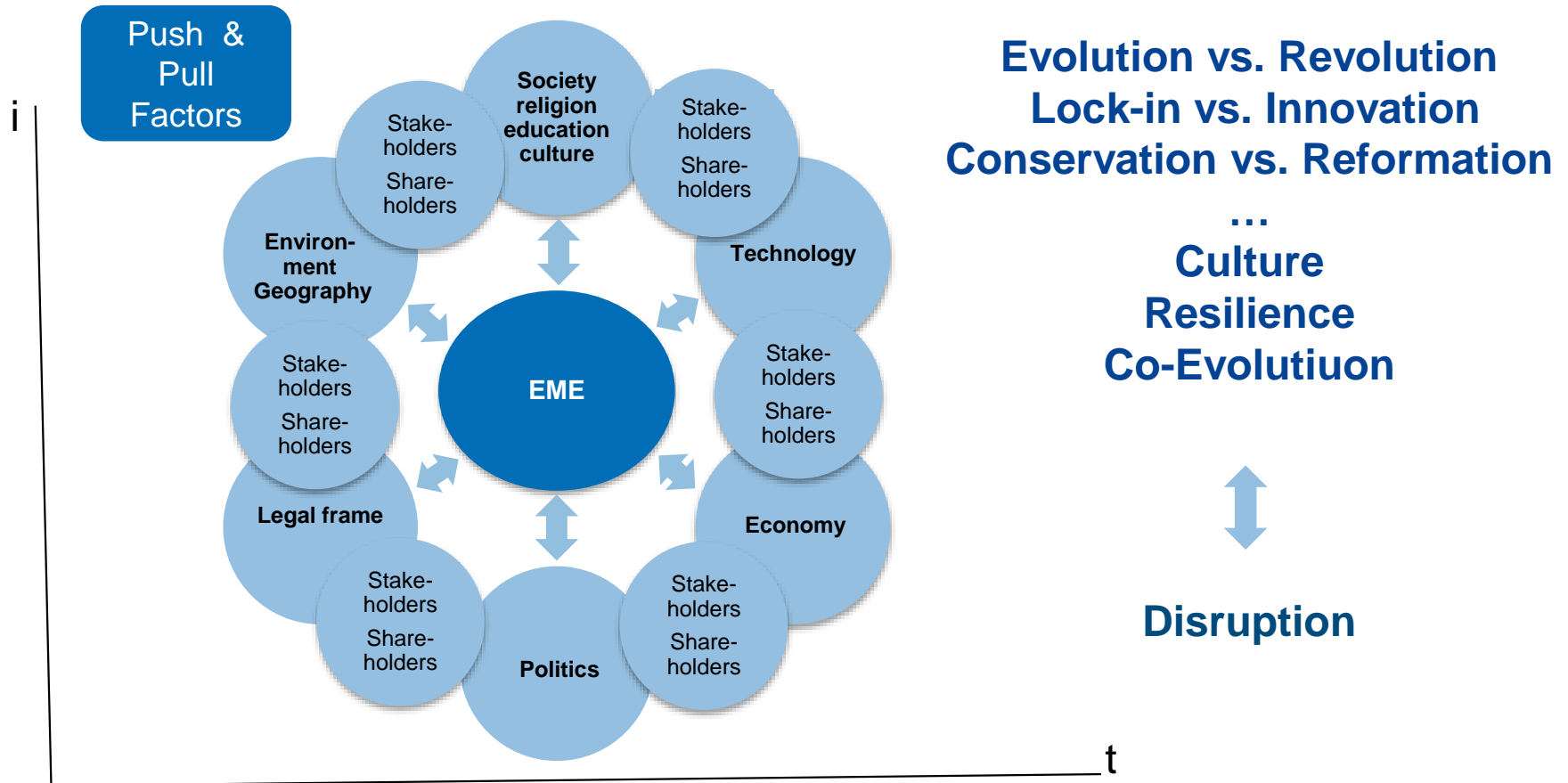


Teaching
MSc. Program
Sustainability &
Corporations

Research
Prosumer Lab
ULLI

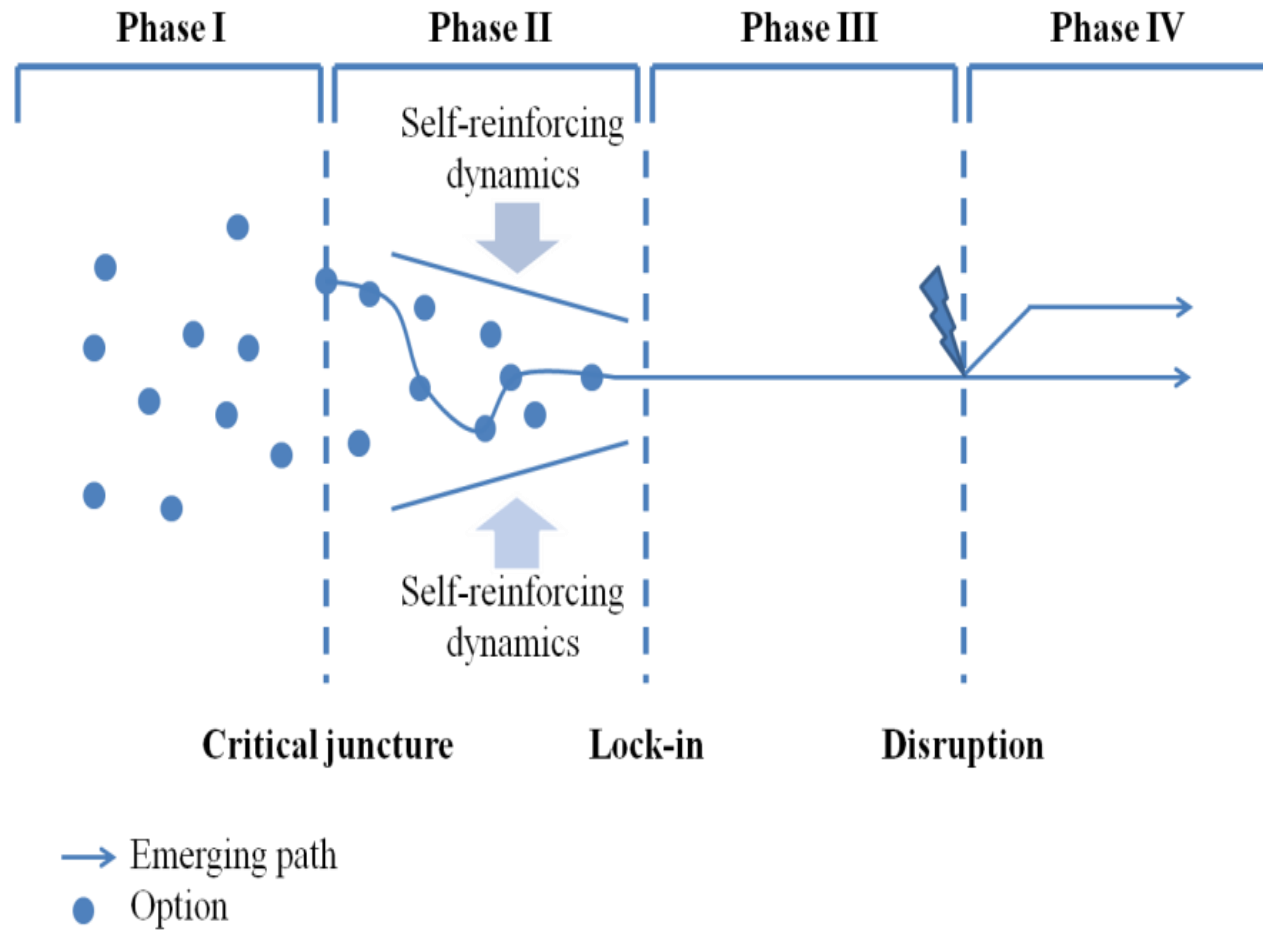
Aim: holistic solutions in theory and applied science
Multi criteria approach: topics, methods, concepts

Approach: Reciprocity – ... but how? (STEPLE Concept)



„Unknown Unknowns“, Rumsfeld, 2002; „Black Swans“, Taleb, 2007

Overcoming suboptimal energy paths and lock-ins



Sydow et.al. 2009

Back to future?

Mobility turns – Energy turns, the beginning of the carbon era

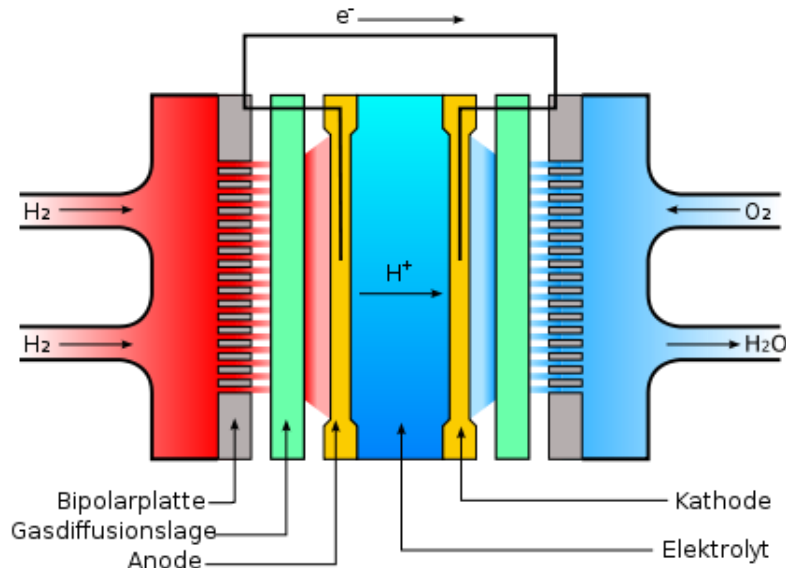


Disruptive technology
Steam railways 1825 ff.

1840 vision

Quelle: Weißmann, Andreas, Von Menschen und Räumen. Integrative Umweltgeschichte im Unterricht, in: Praxis Geschichte, 1997, 4, S.12 u. 13, hier S.12.

Electrification – battle of systems & end of carbon era?



Mercedes-Benz F-Cell, 2010.



Einsatz zur Energieversorgung in Raumfahrzeugen und U-Booten

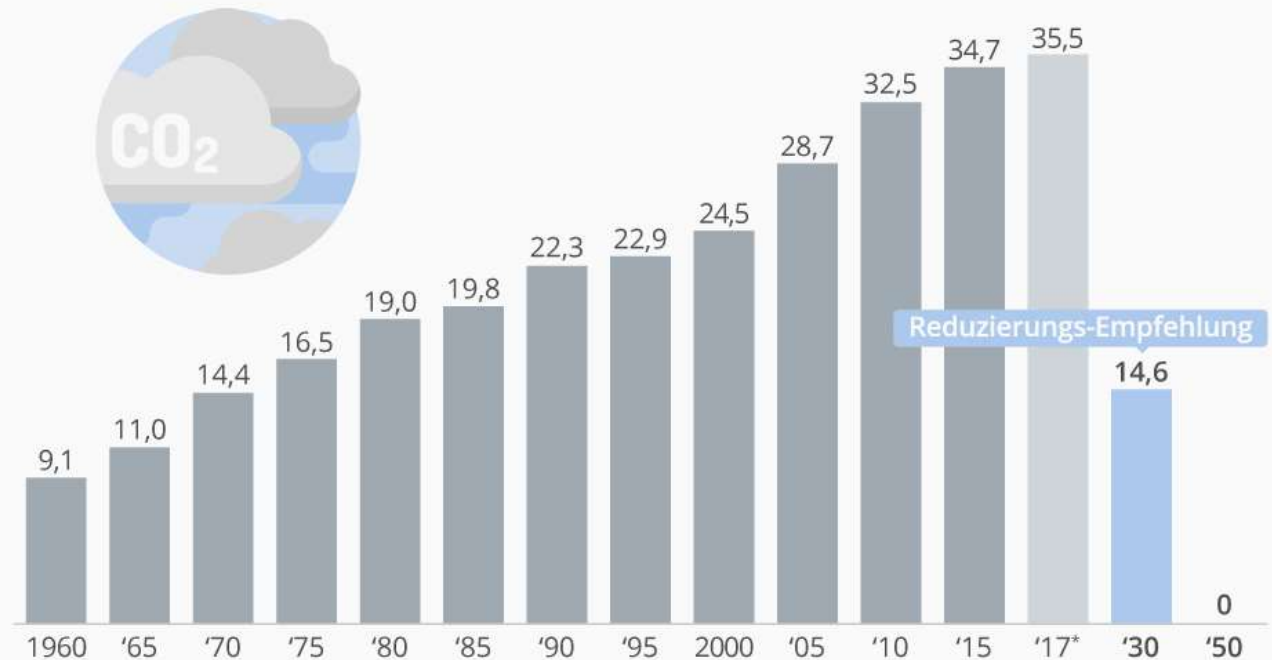


Erste Serienauto mit Hybrid-Brennstoffzellenantrieb: Toyota FCV, 2014

Carbon dioxide – mega challenge

So schnell muss die Welt den CO₂-Ausstoß reduzieren

Weltweiter CO₂-Ausstoß bis 2017 und Reduzierungs-Empfehlung des Weltklimarats (in Mrd. t)



CC BY ND
@Statista_com

* Prognose

Quellen: Global Carbon Project, Spiegel Online

statista

Concept – Back to future? From fossile to renewable

- Efficient **Change Management** under risk and uncertainty
Technological innovation & energy production & consumption
- ‚magic‘ triangle economy - society – technology
-

Topics

Renewable mobility

Prosumer & sharing economy

Energy infrastructures

Technology systems analysis

Rebound effects = **reducing consumption**

Methods

- Multi criteria (quali & quanti), systematic longtime perspective
systems and processes
integrated inclusive analysis, combining stakeholder and shareholder perspectives
- **Opportunity for developping countries: leapfrogging & digital shift**

Summing up – The Blue Planet

**Let us save the world together
Let us start right now
Incipit vita nova
at
UFmG**

- Apollo 10, 1969
Origin of a new understanding of
the planet



Too busy to cooperate?

