

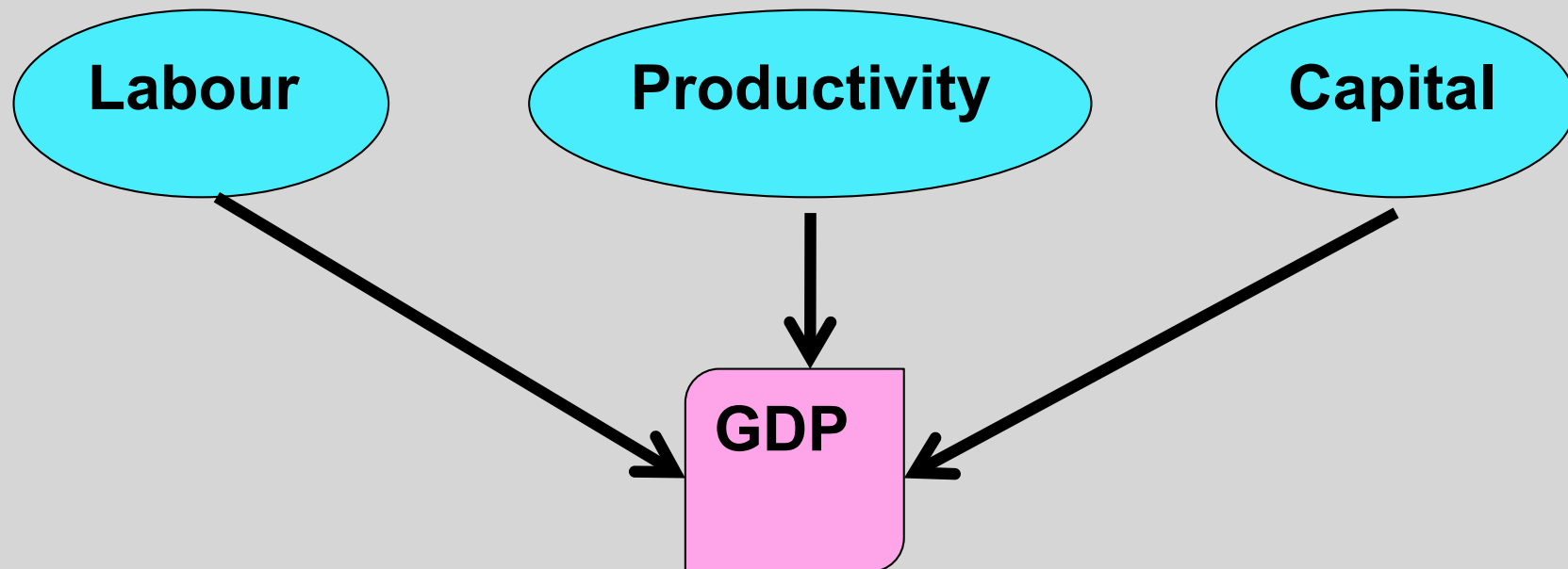
Research and Development Programmes: The Role of the University in Society

Werner Rothengatter

Karlsruhe Institute of Technology

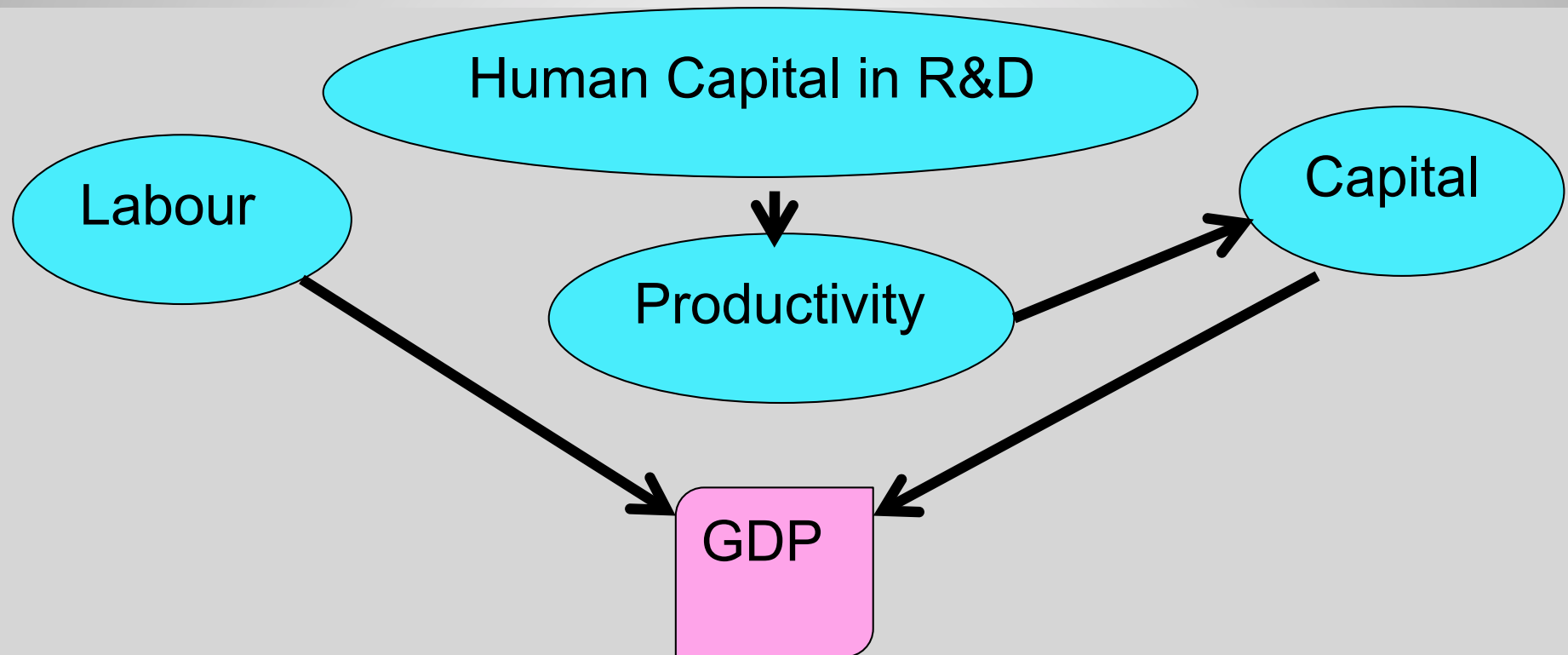
The Role of the University for Society

- Impact of research on economic and social development
- Impacts of research organisation
- Example: The Karlsruhe Institute of Technology
- Technological and regional spin-offs



$$Y = A^* f(L, K)$$

Y: gross national product
L: labour input
K: capital input
A: productivity measure

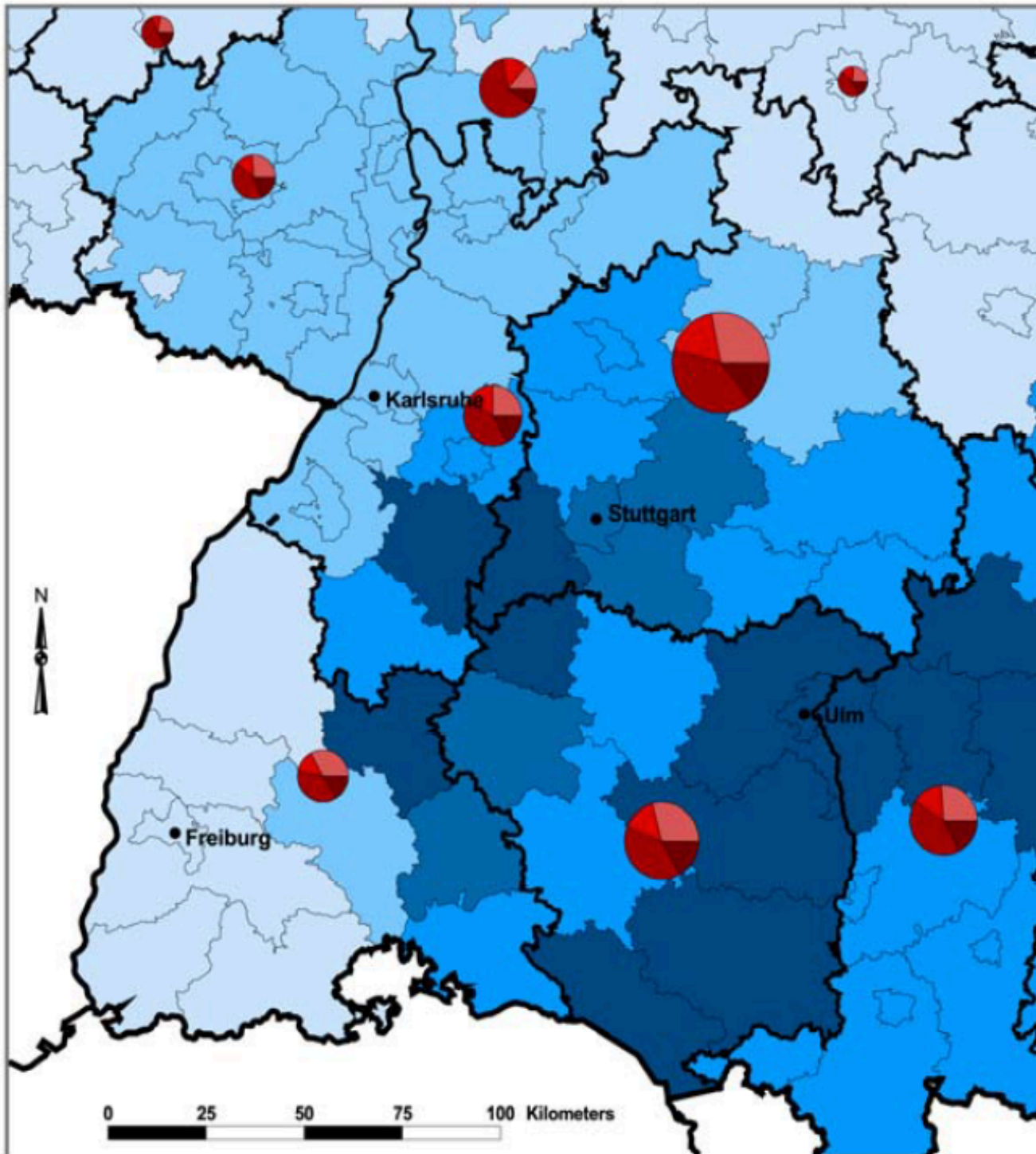


$$\dot{A} = \frac{dA}{dt} = \delta * H_A * A$$

A: tech. knowledge

H_A : human capital

δ : productivity of H_A in R&D



WEI of HSR Stuttgart-Ulm

regional impacts:

dark blue: high

Light blue: low

(in % of GDP)

sector impacts:

areas of red circles

light.: industry

light-med: trade,

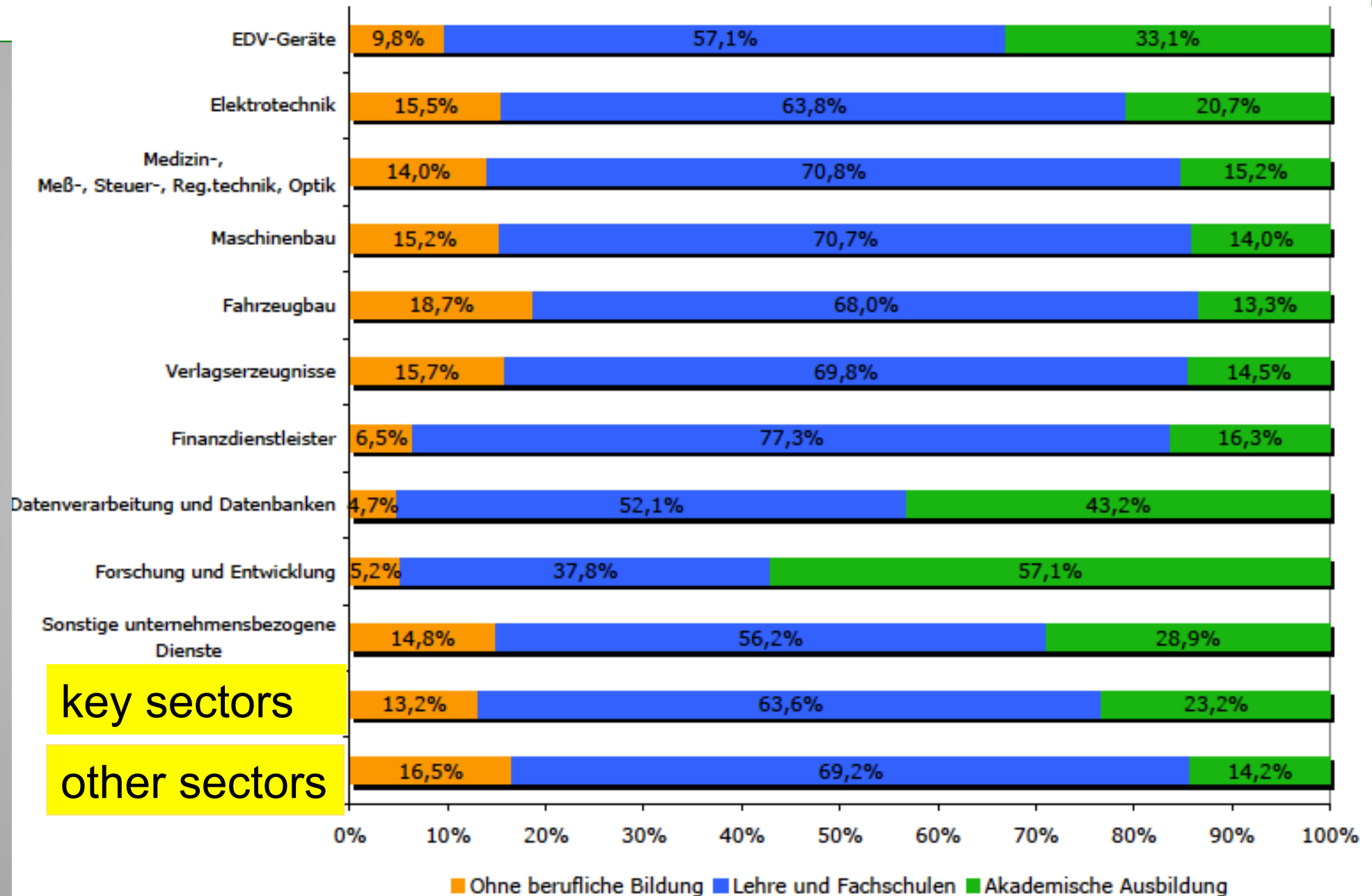
transport, tourism

med-dark: commer-

cial services

dark: public

services



TEN-T and the status of CNC

Infrastructure planning

ECON

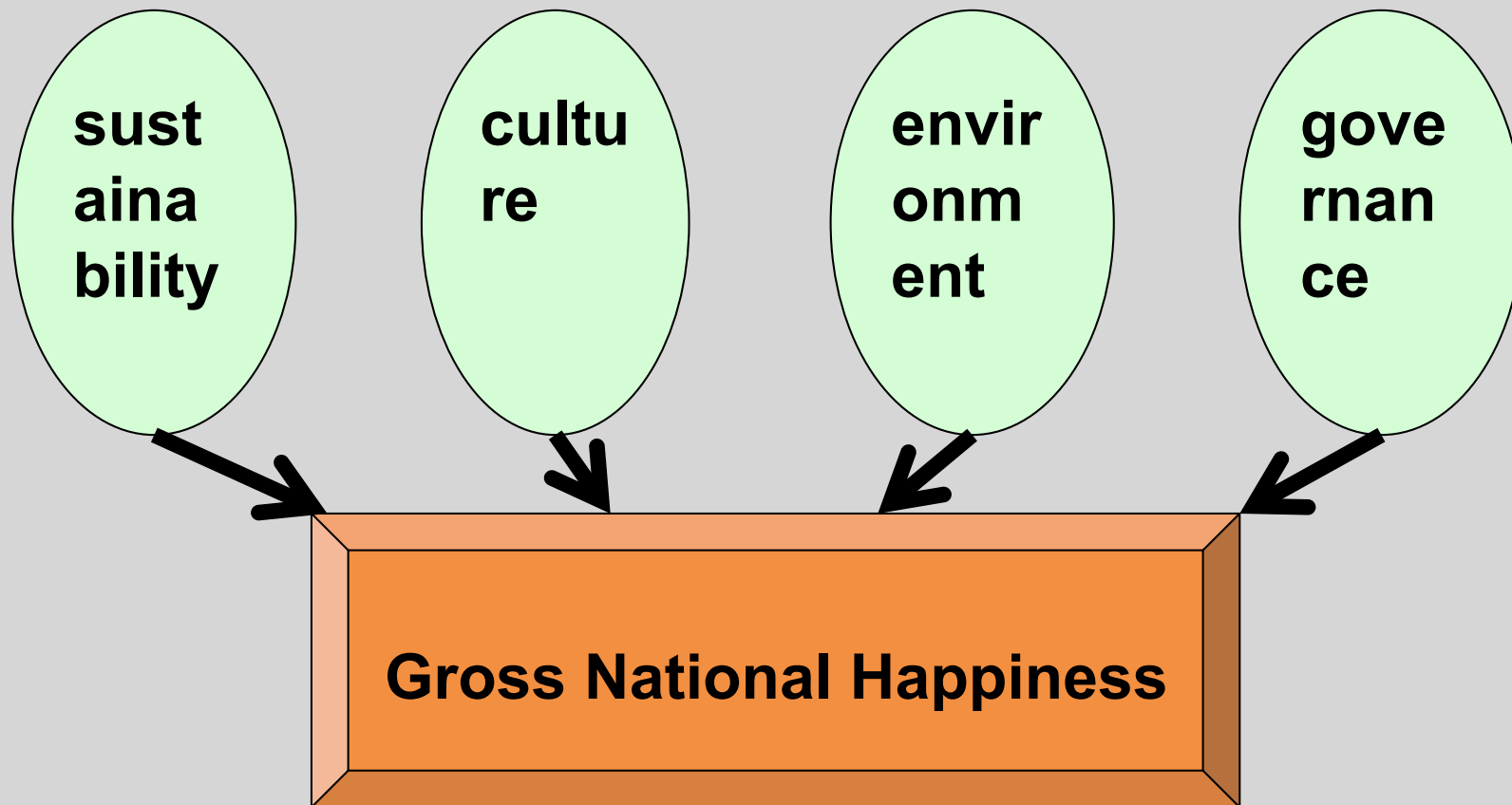
TEN-T
CN



Corri-
dors

Happiness Instead of Material Product:

GNH in Bhutan



Human behaviour is not only governed by utility or profit maximisation rather than by good memories.

- ⊙ **Security preference, loss aversion**
- ⊙ **„Do ut des“ expectations**
- ⊙ **Trust, sympathy**
- ⊙ **Empathy**

Decisions under uncertainty: Heuristics based on emotions or experience and their biases.

Thinking fast and slow!

Results of R&D reduce uncertainty and increase security

Examples:

- ⊙ Medical research for better health consciousness
- ⊙ Environmental research for propulsion technology
- ⊙ Cryptographical research for protection of privacy
- ⊙ Climate research for increasing empathy

Happiness increases with constant salary and wealth.

Researchers feel happy with new insights.

Examples:

- ⊙ Grigori Perelman and the Poincaré problem
- ⊙ Inventors like Carl Benz or the Baron von Drais

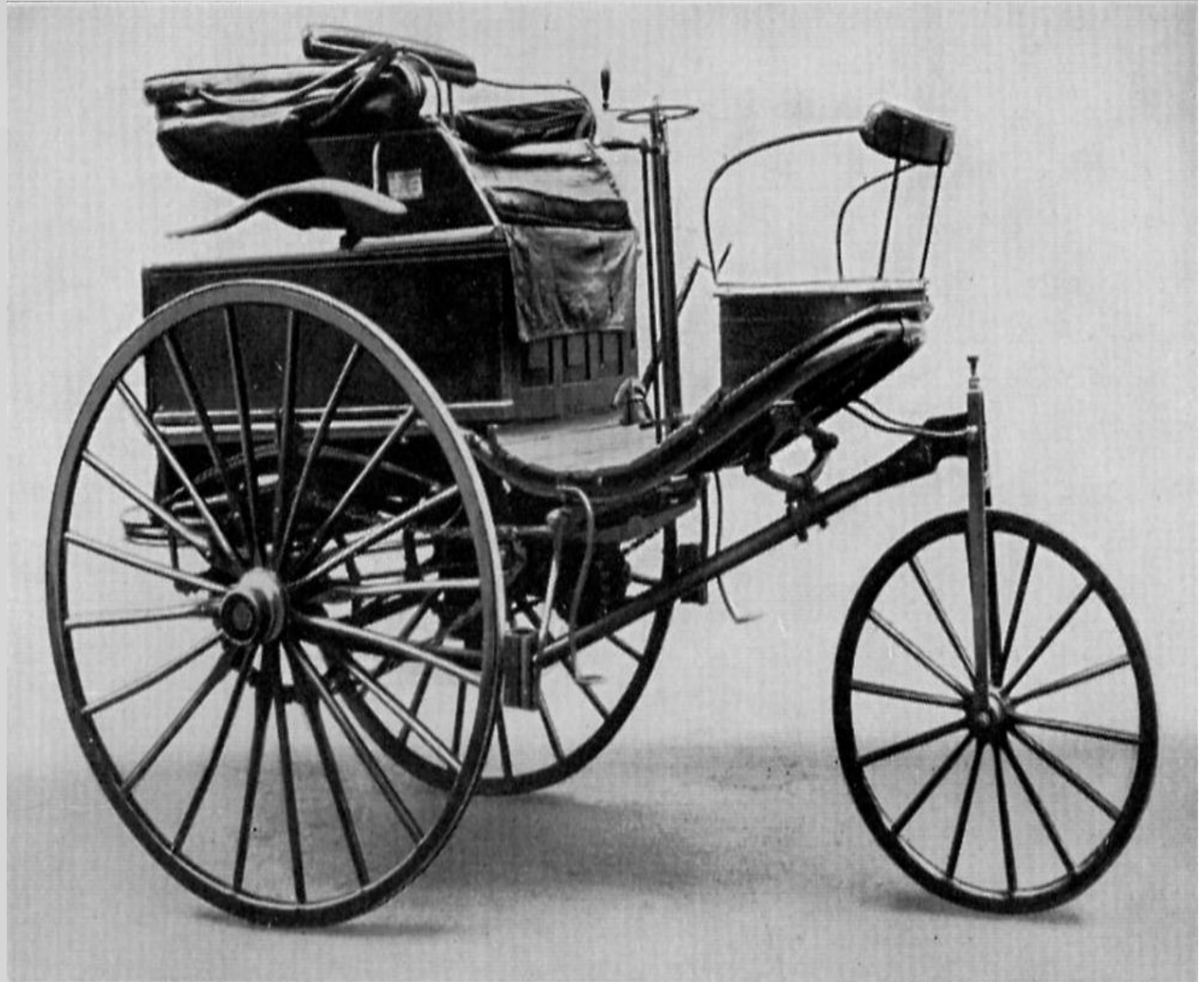
Counter-examples

- ⊙ Craig Venter
- ⊙ J.M. Keynes ?
- ⊙ M. Scholes ??

Remember: Romer model on the research market.

Berta and Carl Benz Motor Car 1886

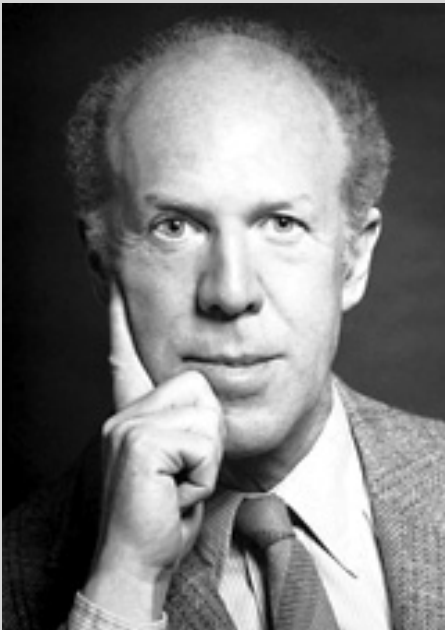
ECON





Research Organisation: Is Small Always Beautiful?





Gerard Debreu

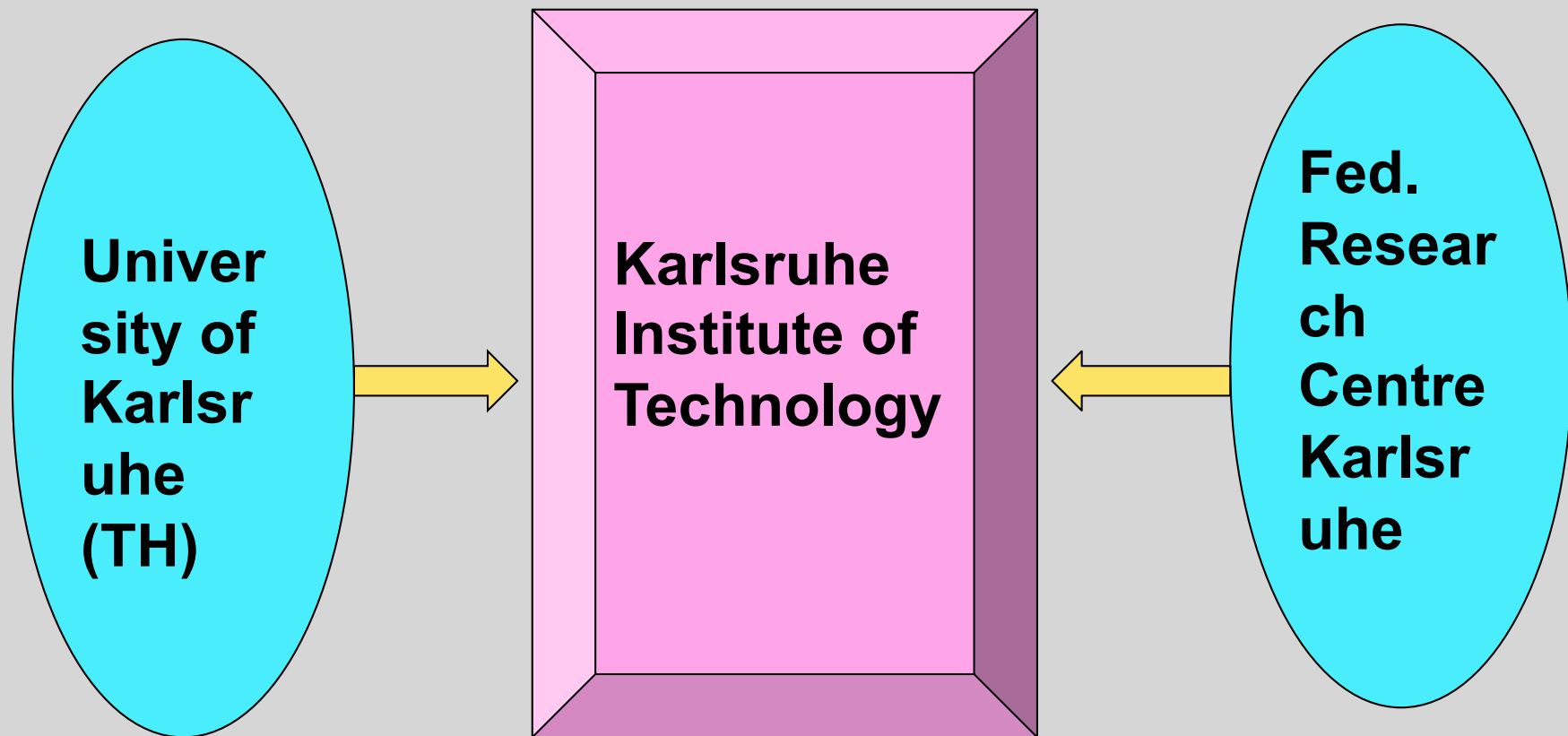


Jean Tirole



Research Organisation: Is Big Always Effective?





**Poly-
tech.
School**



1825

“ The Polytechnic Institute at Carlsruhe, which is regarded as the model school of Germany and perhaps of Europe, is nearer what it is intended the Massachusetts Institute of Technology shall be than any other foreign institution.”

W. B. Rogers, Founding Director of MIT, 1864

**Heinrich
Hertz**



**e-magn.
waves
1886**

**Etienne
Laspeyres**



**Price
Index
1871**

- ⊙ **Faculties according to scientific disciplines
(11 in 2009)**
- ⊙ **Basic funding from the State BW for small units
(chair + some research assistants + secretary)
+ project funding**
- ⊙ **A few bigger institutes (mechanical, civil
engineering, informatics, later also economics)**
- ⊙ **Growth dependent on success on project market**

- ❖ **Founded in 1956 as a Federal Research Centre for Nuclear Research**
- ❖ **Member of the Helmholtz Society of Fed. Res. Inst.**
- ✚ **Research scope extended in the 1970s: Meteorology, climate, physics, chemistry**
- ✚ **Organisation by large departments and institutes**
- ✚ **Large research programmes, mainly sponsored by the Ministry of Science and Technology**

- **Plan to merge to KIT in 2006**
- **Univ. was elected „Elite University“;
„Excellence Initiative“**
- **Title was lost in 2012**

Federal Scientific Council

**Helm-
holtz
18**

**Fraun
hofer
80**

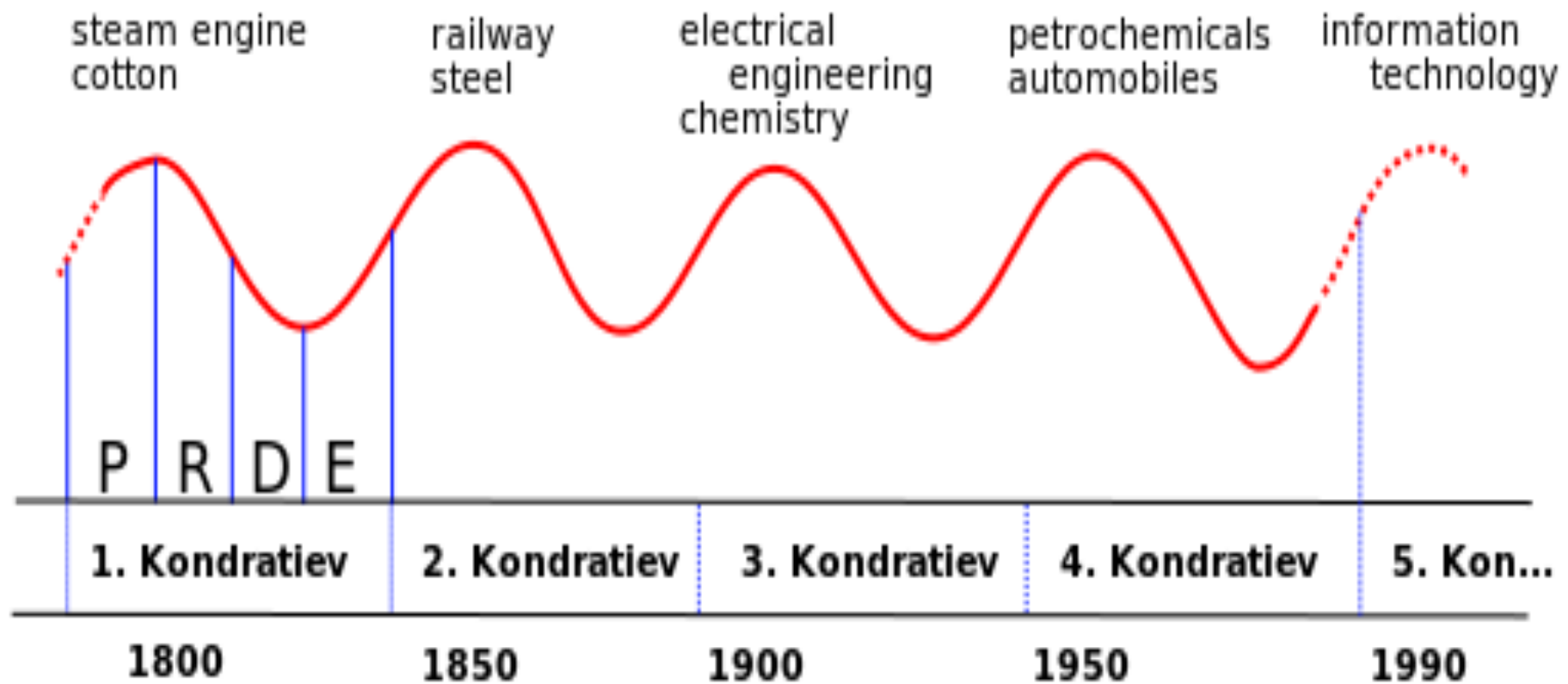
**Max
Plac
nck
80**

**Univer
sities
106**

- **Biggest Ger. Res. institute**
- **9,500 employees, 350 Profs., 850 mill. € turnover**
- **Reasons for failure with third round of Excellence Initiative:**
 - **rising concern of other research orgs.**
 - **arrogance of the „big“ player**
 - **missing creativity of research proposals**

- ◆ **Reorganisation with larger departments, faculties and institutes**
- ◆ **Separation of research and education, faculties for teaching, departments for research**
- ◆ **Formation of research clusters**
- ◆ **Example: Centre for Mobility Research, 7 institutes**

Kondratieff Cycles



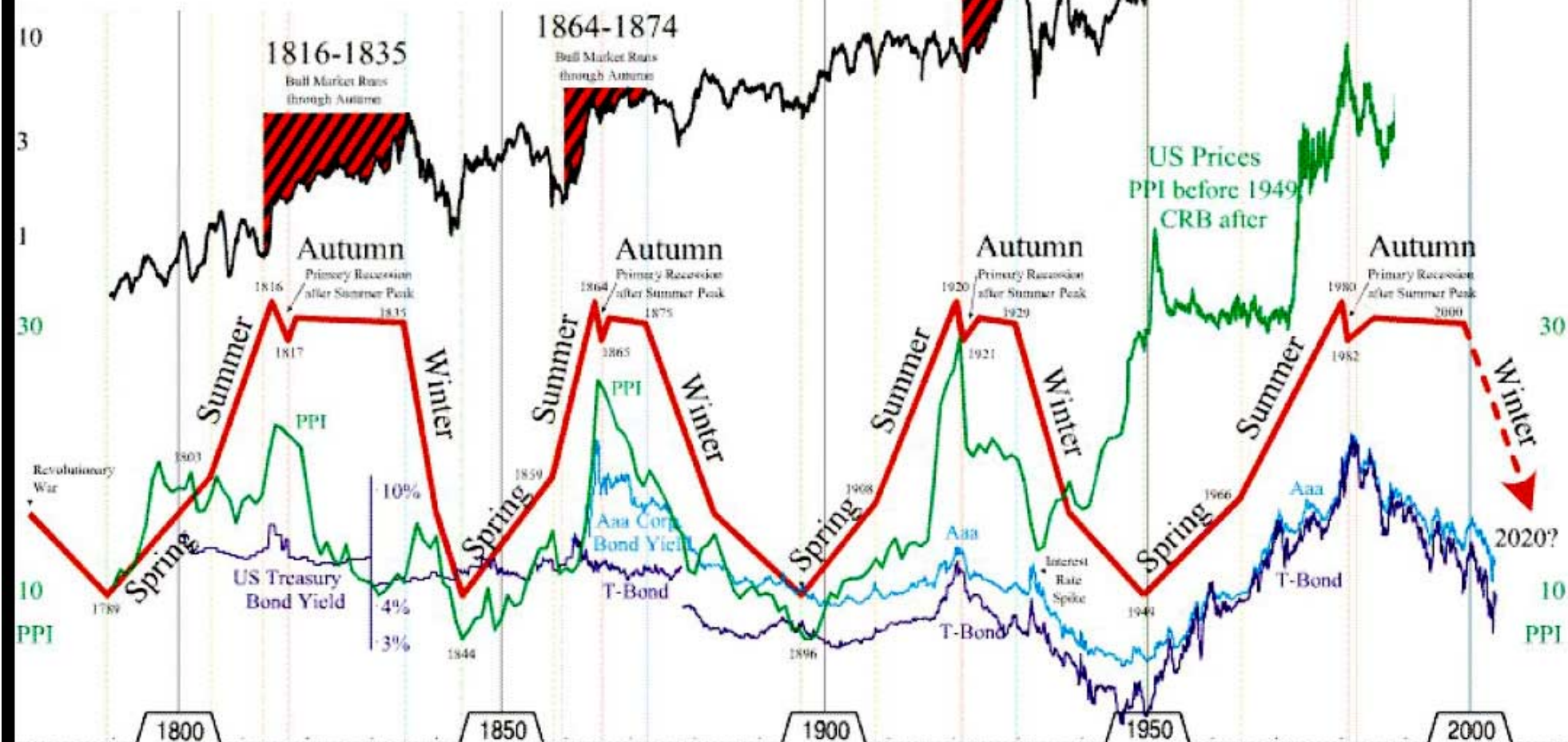
P: prosperity
R: recession
D: depression
E: improvement

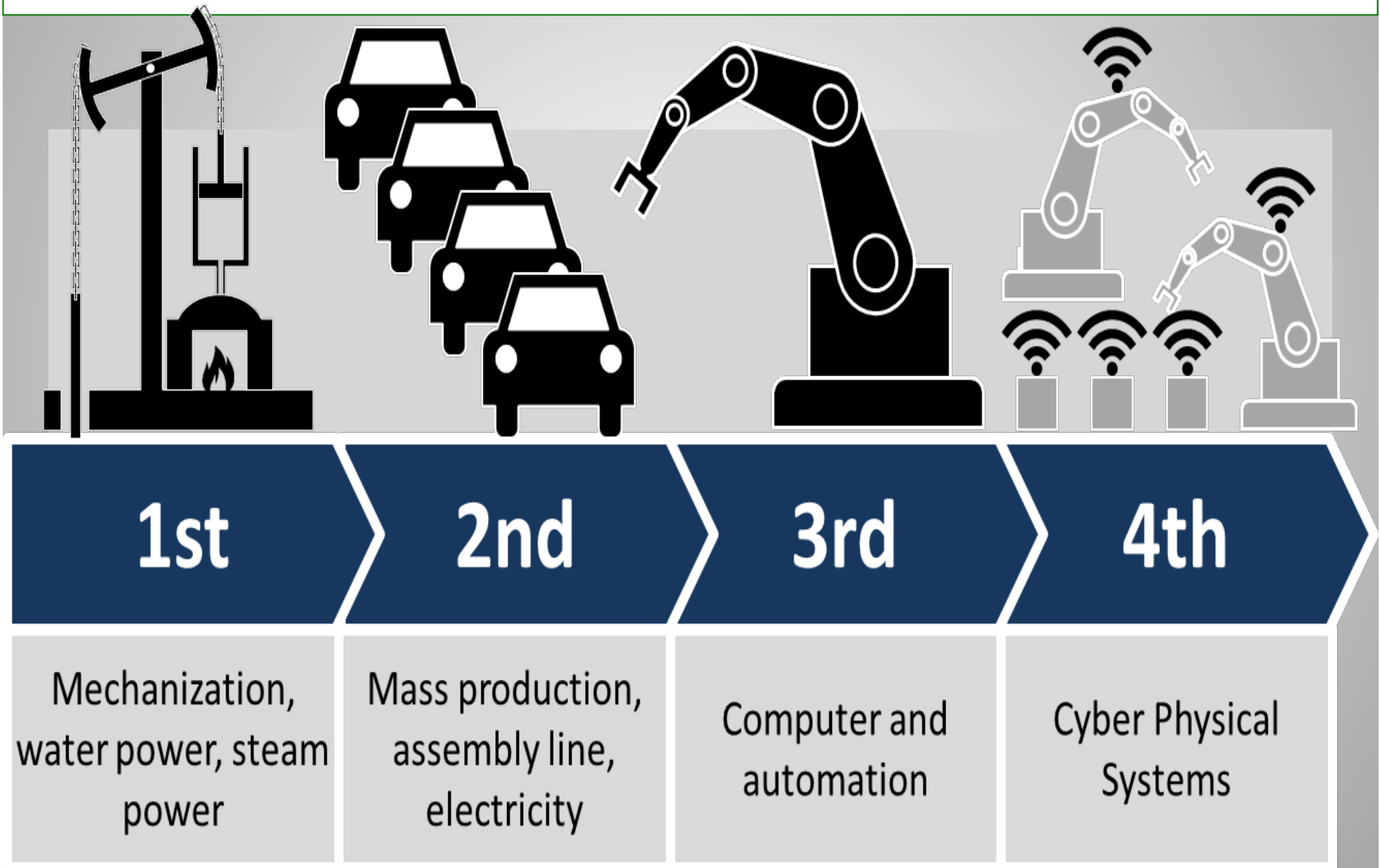
Chart courtesy of the longwaveanalyst.ca

Four Kondratieff Waves in the U.S.

June 1789 through October 2003

	1	2	3	4
Spring	1789-1802	1845-1858	1896-1907	1949-1966
Summer	1803-1816	1859-1864	1908-1920	1966-1981
Autumn	1816-1835	1864-1874	1921-1929	1982-2000
Winter	1835-1844	1875-1896	1930-1949	2000-2020?

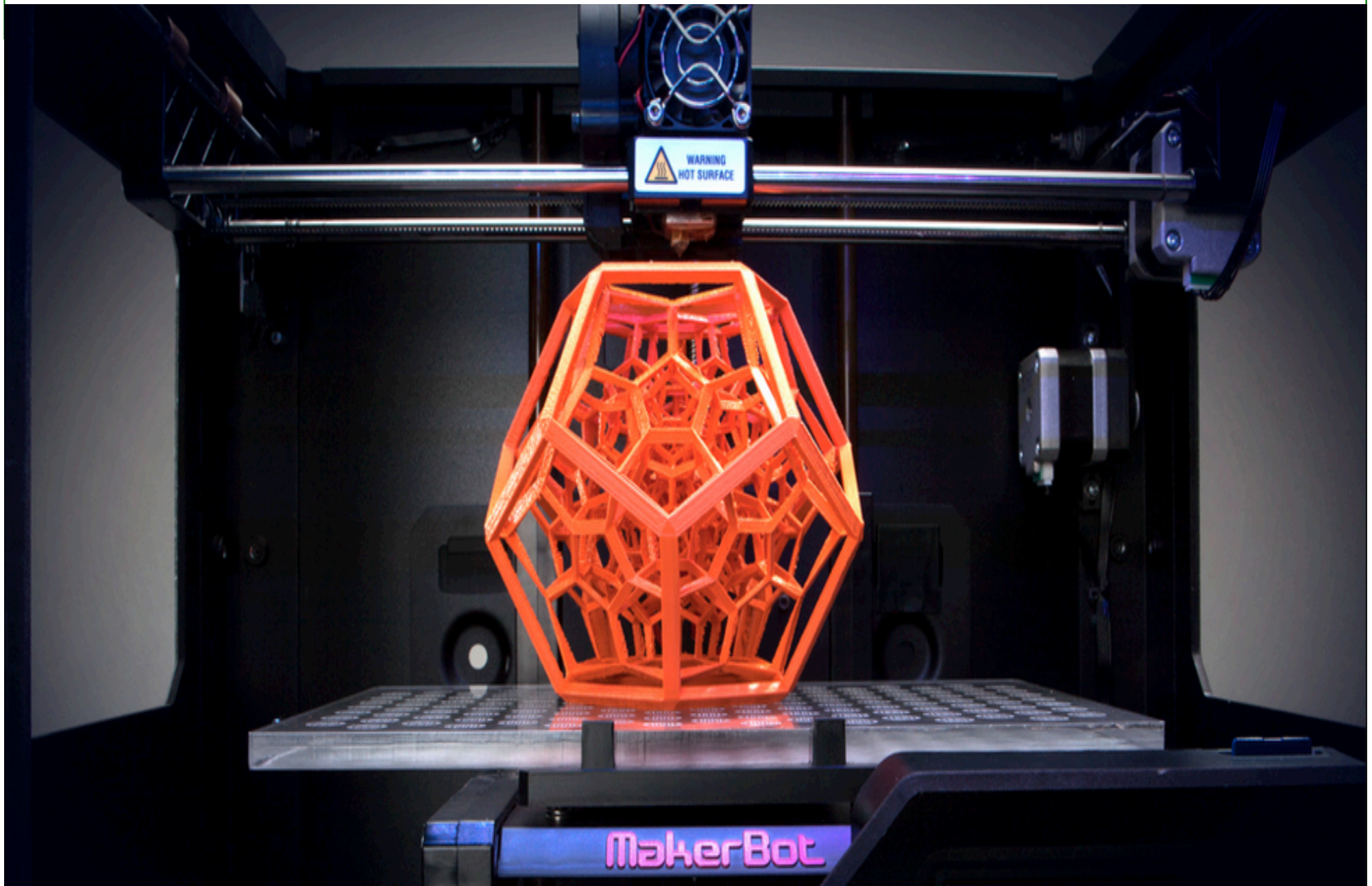




Industry 4.0:

- Cyber economy
- Internet of things
- Cloud computing
- Digitalisation processes in industry and society





Regional Impacts

**Hightech Brochure „Technology Region
Karlsruhe**

„Hightech meets savoir vivre“.

**Hightech trifft
Lebensart**

Willkommen in der TechnologieRegion Karlsruhe





**Werner Rothengatter
Karlsruhe Institute of Technology**

rothengatter@kit.edu

