VolkswagenStiftung

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How Can Europe Inspire and Support More Breakthroughs in Basic Research? A Funder‘s Perspective

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"Sometimes we don't know what we are looking for, until we finally found it."

Ludwig Wittgenstein

Content

Major Changes and Challenges in Research and Higher Education (I)

Electronic impact on the creation, distribution, and absorption of new knowledge.

➔ **How are we to bridge the gap between the rapidity of change and the time-lag of institutional responses?**

The increased emphasis on transdisciplinary approaches.

➔ **How can we stimulate the implementation of trans-disciplinary institutional structures, in particular in our universities?**

Major Changes and Challenges in Research and Higher Education (II)

The move from bi-, or trilateral internationalisation towards network approaches and strategic alliances in higher education and research.

- ➔ **How can we meet the growing demand for interculturally competent people?**

- ➔ **What can we do to overcome the disparities between advanced and developing countries?**

Major Changes and Challenges in Research and Higher Education (III)

The changing public private interface and its consequences for the division of labour in our RTD systems.

➔ **How can we succeed in initiating a process of deregulation, mutual learning, and of gradually building trust in each other's intentions and capabilities?**

The need to integrate evaluation, foresight, and priority setting, and also to increase public involvement.

➔ **How are we to provide valid and coherent information for the decision-making processes?**

And above all …

How can we inspire and support more breakthroughs in basic research?

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Second Best? – The Shanghai Ranking 2011

Statistics by Region

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Region	Top 20	Top 100	Top 200	Top 300	Top 400	Top 500
Americas	17	57	100	132	162	184
Europe	3	34	75	123	164	204
Asia/Pacific	0	10	25	44	72	108
Africa	0	0	0	1	2	4
Total	20	101	200	300	400	500

Source: http://www.shanghairanking.com/ARWU-Statistics-2011.html

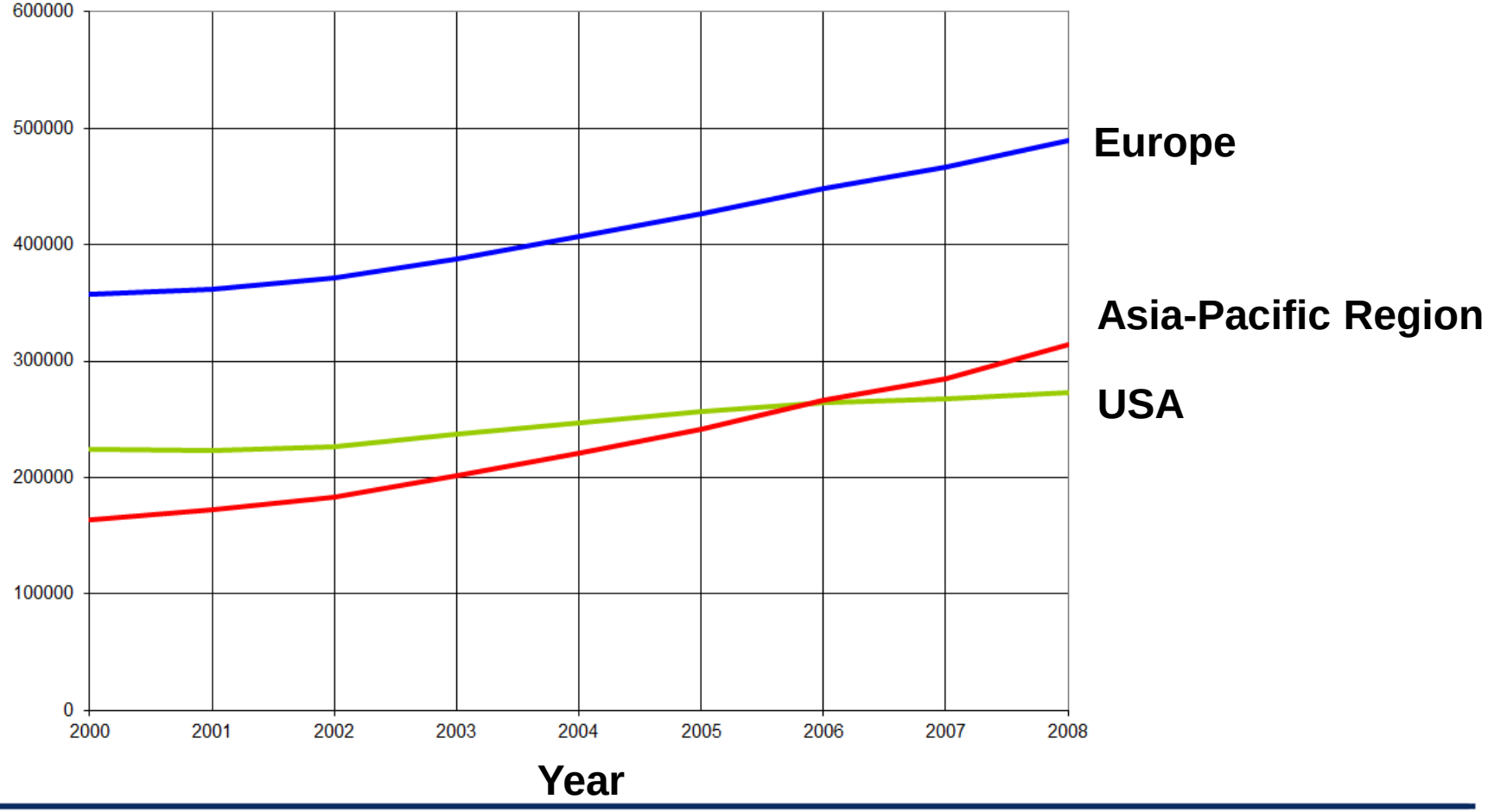
European Upper Middle Class – The THES Ranking 2010/11

TOP EUROPEAN UNIVERSITIES 2010

REGION RANK ▼	INSTITUTION	COUNTRY / REGION	OVERALL SCORE change
1	University of Cambridge	United Kingdom	91.2
1	University of Oxford	United Kingdom	91.2
3	Imperial College London	United Kingdom	90.6
4	Swiss Federal Institute of Technology Zurich	Switzerland	83.4
5	University College London	United Kingdom	78.4
6	Ecole Polytechnique	France	69.5
7	University of Edinburgh	United Kingdom	69.2
8	Ecole Normale Superieure, Paris	France	68.6
9	University of Göttingen	Germany	67.0
9	Karolinska Institute	Sweden	67.0

Source: http://www.timeshighereducation.co.uk/world-university-rankings/2010-2011

Publication of Scientific Papers



European Research in Global Competition

Europe faces increased global competition – particularly in the field of research and technological development.

Europe's share of trade in high-tech products is stable, while China's market share has grown significantly.

Europe lags behind the US and Japan in terms of patent intensity.

In the EU, the linkage between technology (patented inventions) and the science base is much weaker than in the US.

The Race for Scientific Output

The EU is the world's largest producer of scientific output, as measured by its share in the world total of peer reviewed scientific articles.

However, the EU lags behind the US in terms of citation impact of its scientific output and prestigious awards.

Moreover, the rapid growth of scientific output in Asia-Pacific nations is in stark contrast to slow growth in Europe and stagnation in the US.

Barriers to Breakthroughs

Europe is **loosing ground in the field of basic breakthroughs**.

Thirty years ago, European scientists dominated the Nobel Prize lists. Today, Nobel prizes and similarly **prestigious awards are won mainly by scientists working in the USA**.

Before the establishment of the ERC in 2007, Europe suffered from an almost total **lack of transnational support of basic and strategic research**.

Research is still not supported sufficiently in Europe, particularly with respect to risky, open-ended ‘frontier research’.

How can we enable more breakthroughs and foster a culture of creativity?

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"***My questions are not as absurd as they seem, because creativity in science, as in the arts, cannot be organized. It arises spontaneously from individual talent***."

Max Perutz, from Preface to *I Wish I'd Made You Angry Earlier*

Pre-Conditions for Creativity

Communication

Diversity

Serendipity

Competence

Innovativeness

Courage

Persistence/Perseverance

1. Competence

Differentiation in quality and excellence

Competence can best be developed in an intellectually stimulating environment.

➔ It takes time, trust, and considerable investments.

Concentration of funding not just on researchers that are already excellent, but also on those who have the potential to become excellent.

➔ Attracting the next generation of researchers.

2. Courage

Researchers and funders must both be courageous and adventurous.

Based on their autonomy, foundations can and should provide incentives for research in promising areas and stimulate new developments.

They should use their independence to

- make offers to researchers in fields that are underdeveloped, or appear to be particularly promising,
- support high-risk projects which do not receive public support,
- foster research in and on regions and countries that are not on current political agendas.

3. Communication

Thought-provoking discussions are essential to scientific progress. It is an important task of researchers and funding-institutions to:

- foster interdisciplinary and intercultural exchange,
- strengthen the international interaction between researchers by:
  - configuring adequate research structures,
  - establishing transnational study groups,
  - developing research networks and exchange-programs,
  - fostering the cooperation between research centres and universities.

4. Innovativeness

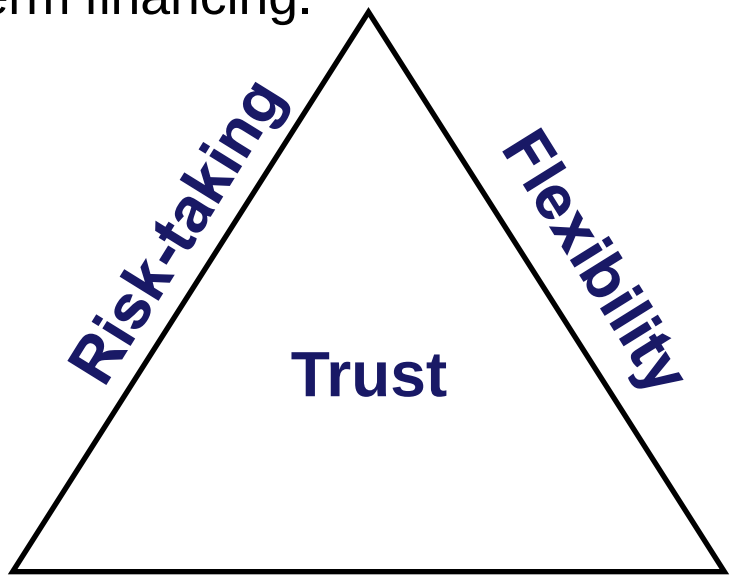
To foster innovativeness is to appreciate unconventional ways of thinking.

Radically new approaches and transformative research endeavors require different modes of communication, selection, and support (successive grants, long term commitments).

The challenge remains how to separate the wheat from the chaff without discouraging the most original thinkers and creative researchers.

5. Persistency/Perseverance

The involvement of funding-institutions should be based on trust and long-term commitment instead of brand making and short-term financing.



Quality assurance and evaluation

6. Diversity

A clear need for more transdisciplinary approaches and new opportunities for young researchers:

- Need for a realignment between scientific values and society's needs.
- Common wisdom: new knowledge is usually formed at the boundaries of established fields. Interfaces must be activated.
- Subject-oriented organisation of European universities and corresponding career patterns do not work in favour of problem-oriented research approaches.
- Marked emphasis of universities on discipline-based specialisation prevents researchers from committing themselves to inter-, and transdisciplinary research.

7. Serendipity

Creativity needs room for the unexpected.

Efficient and effective administrative structures

- support scientists in research and teaching,
- unburden them as far as possible from bureaucratic responsibilities,
- provide the researchers with as much time and space as possible
  - to interact with their colleagues and
  - to focus on their respective research questions.

Nevertheless: **inspiring thoughts cannot be planned for**.

Richard Feynman and the Wobbling Plate

Legend has it that observing a wobbling plate snapped the physicist Richard Feynman out of a period of burnout:

> **"*It was effortless. It was easy to play with these things. It was like uncorking a bottle: Everything flowed out effortlessly. I almost tried to resist it! There was no importance to what I was doing, but ultimately there was. The diagrams and the whole business that I got the Nobel Prize for came from that piddling around with the wobbling plate*."**
>
> Richard Feynman, from *Surely You're Joking Mr. Feynman*, p. 157-158.

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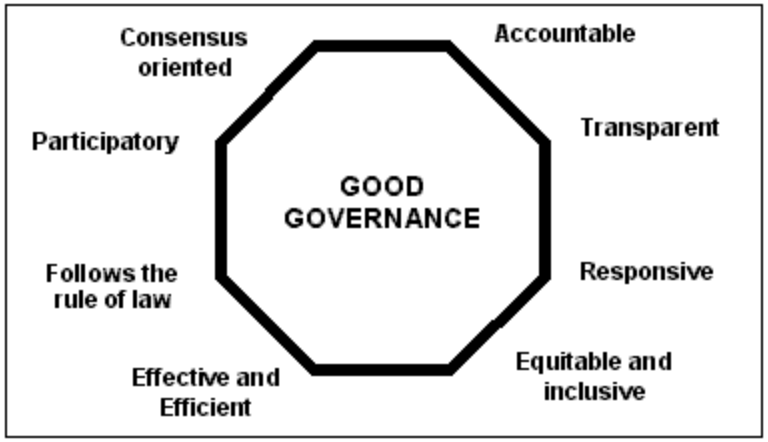


The Need for Good Governance

- The current **economic crisis** and its impact on government funds,
- the enormous consequences involved in **climate change**,
- the rapidity of **technological innovation**,
- the **high degree of uncertainty** in the face of complex issues,
- the **fragility** of institutional arrangements

call for:

- new modes of thinking,
- new modes of operation,
- **new forms of governance.**

Pillars of Success of a University

→ to access
→ to distribute
→ to produce

new knowledge and new technologies

Vision	Culture	Organisation	Resources
Develop corporate identity Define long-term objectives Create a climate of change	Keep cultural heritage alive Improve quality Create a climate of mutual trust	Improve Governance Structures Enhance openness and transparency Make management processes more effective	Recruit high quality personnel Provide sufficient funds Secure high standards in infrastructure

The Urgent Need for More Research-Friendly Institutional Structures and Processes (I)

The most important prerequisites for a successfully performing research institution are inspiring environments as well as research-friendly and efficient governance and decision-making structures.

A move towards a more professionally organized and autonomous university is needed.

Therefore, research institutions have to:

- constantly tap their resources and realize their potential,
- ensure efficiency in their spending,
- accelerate and simplify their processes,
- intensify communication within the organization and beyond.

The Urgent Need for More Research-Friendly Institutional Structures and Processes (II)

Two basic concepts are institutional conditions sine qua non for ground breaking research:

- an organisational structure which facilitates crossdisciplinary interaction,
- strong leadership connected with very high quality standards

Research institutions have reacted to the increasing complexity of knowledge creation and research with an increase in size and diversity. This often creates an increase in bureaucracy and hierarchic structures.

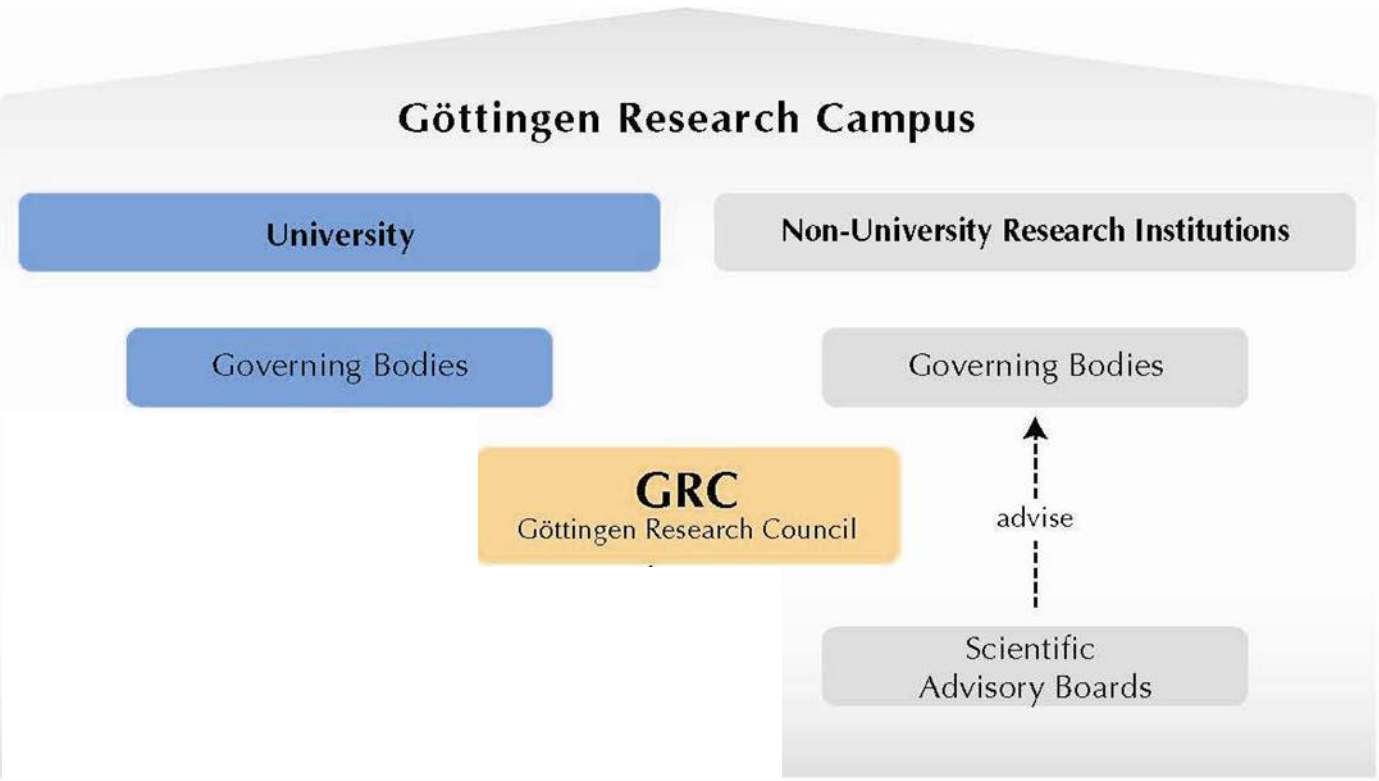
Universities Need Efficient and Effective Governance Structures …

- … to support scientists and scholars in research and teaching, and to unburden them as far as possible from bureaucratic responsibilities,
- … to provide the researchers with as much time and space as possible to interact with their colleagues and to focus on their respective research questions,
- … to improve communication within the institution and with external stakeholders,
- … to foster a culture of creativity and mutual trust,
- … to create space for talents,
- … to make their institution ready to face the challenges of the 21st Century.

Ingredients of a Successful Research Institution

- Small individual research groups;
- Group leaders are active bench scientists;
- Research is internally funded at a dependable and generous level;
- No pressure for the work to be of immediate relevance or commercial value;
- Excellent support facilities and infrastructure;
- High staff turnover and limited tenure (many early career stage researchers);
- Originality, creativity, and collegiality are valued and supported;
- Emphasis on tackling difficult and important research problems.

Crossing Institutional Boundaries: The Case of Göttingen University



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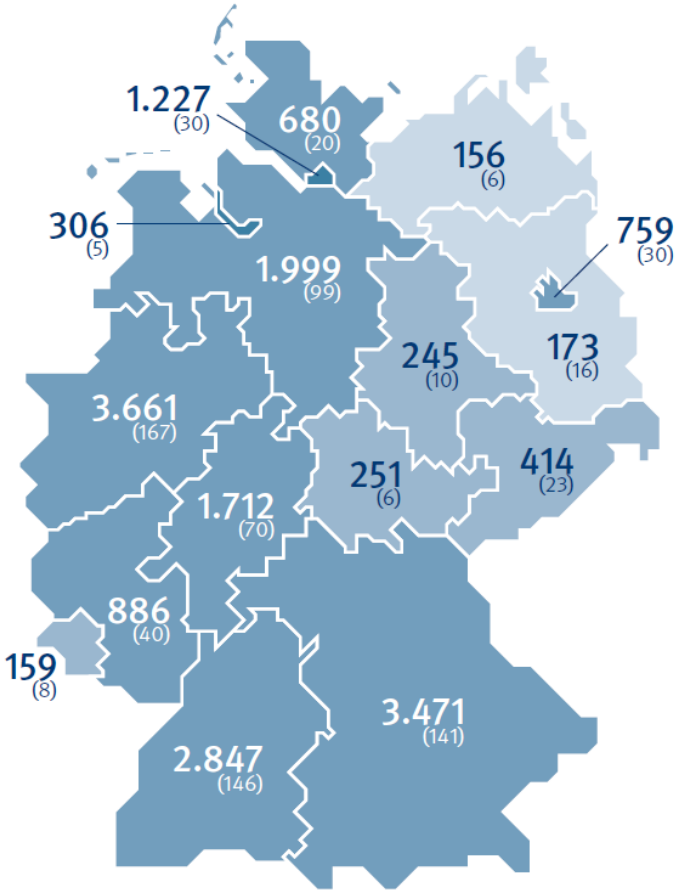

The Role of Foundations in Encouraging Change (I)

Unlike publicly financed agencies which have to provide equal opportunities for all institutions, private foundations

- can act much more freely, flexibly, and quickly,
- can put objectives in front of rules and regulations,
- do not have to wait for political consensus.

They can act autonomously

- in supporting the first experiments in new areas,
- in taking risks,
- in being front runners in institutional reform.

The Role of Foundations in Encouraging Change (II)

Due to the perpetuity of their funds, foundations have the capacity to be reliable partners, willing to foster risky projects, and to help researchers to break new grounds.

They are independent from election periods, but also independent from shareholders' views.

They can strive to give insights, to develop ideas, and to find solutions where politicians, or industry cannot or do not want to embark upon such endeavors.

Their independency contributes to the inspiring effect that private funding has on the development of research and higher education, but also to the willingness of citizens and enterprises to spend their money on these purposes.

Limits and Limitations of Foundations

Given the billions of Euros spent by public authorities and enterprises, the **impact** of comparatively small-scale foundations is **limited**.

Therefore, foundations heavily rely on **partnerships**.

Nevertheless, foundations have the **flexibility** to quickly respond to the needs of the research community, to **pilot projects**, and trigger spending on research by bigger funders.

By fostering **risky projects**, encouraging change, and helping the most **creative researchers** to break new grounds foundations can create at least a few **islands of success**.

Fostering Transformative Research

"Transformative research is defined as research driven by ideas that have the potential to radically change our understanding of an important existing scientific or engineering concept or leading to the creation of a new paradigm or field of science or engineering. Such research also is characterized by its challenge to current understanding or its pathway to new frontiers."

National Science Board, *Enhancing Support of Transformative Research at the National Science Foundation*, May 2007, p. 10.

How to Encourage Transformative Research

The aim of private funding of transformative research must be

➔ to overcome disciplinary boundaries and

➔ to put new research topics, fields, structures, and approaches on the research agenda.

Transformative research only scarcely originates on its own:

➔ the readiness to engage in ground-breaking research has to be encouraged and facilitated.

➔ **We have to actively pave the way for a culture of creativity.**

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Enabling Breakthroughs – The Role of Universities and Research Institutions

- Move towards research-friendly and efficient governance and decision-making structures;
- Establish an organisational structure which facilitates cross-disciplinary interaction;
- Intensify communication within the institution and beyond;
- Appreciate and support originality, creativity and collegiality;
- Develop new curricula which include non-disciplinary topics ;
- Identify the most promising undergraduates early on;
- Establish a more structured graduate and doctoral education;
- Provide attractive career prospects, including tenure track options;
- Encourage researchers to undertake high-risk projects.

High Risk – High Reward

To foster creativity and to enable more breakthroughs we need:

- More ‘creative spaces’ within large grants, e.g. collaborative research units, centres, and clusters.
- New modes of funding, e.g. medium-, to long-term fellowships for up to ten years.
- Time and space for some thorough rethinking of common wisdom, e.g. research professorships and prestigious awards for senior researchers.
- New modes of peer review, e.g. a two stage process for early-stage researchers including presentations and interviews.

Fostering Individual Creativity

Howard Hughes Medical Institute (USA)

HHMI Investigators

MacArthur Foundation (USA)

MacArthur Fellows Program

Wallenberg Foundation (Sweden)

Wallenberg Academy Fellows

Wellcome Trust (Great Britain)

Investigator Awards

Institutionalizing Creativity

THE ROCKEFELLER UNIVERSITY
Science for the benefit of humanity

Universität Konstanz

Zukunftskolleg
frei • kreativ • verbindend

IST AUSTRIA
Institute of Science and Technology

And what does the Volkswagen Foundation do?

- **Lichtenberg Professorships**
- **Dilthey / Schumpeter Fellowships**
- **Freigeist Fellowships**
- **Peter Paul Ewald Fellowships**
- **Post-doctoral Fellowships in the Humanities at Universities and Research Institutes in the U.S. / Germany**

The Way Ahead

- People and Projects: Different Objectives and Experimental Approaches
- Further Differentiation at the Institutional Level
- Strategic Partnerships at the Global Level
- An Increase in Private Investments
- Local Alliances
- Permeability across Institutions
- Reliable Public Funding for Core Activities.


EVER TRIED
EVER FAILED
NO MATTER
TRY AGAIN
FAIL AGAIN
FAIL BETTER
Samuel Beckett

Thank you for your attention!

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