

64. Annual Meeting of the Max Planck Society
Speech by the President, Prof. Peter Gruss
at the general assembly of the Max Planck Society
on June 6, 2013 in Potsdam

Ladies and gentlemen,

The only natural resource we can leverage is the **gold between our ears!** This statement by a fellow scientist perfectly encapsulates how vitally significant innovations are for us.

What's astonishing is how little we know about this not-so-golden substance between our ears! We can study galaxies light years away and we can investigate the tiniest of molecules, but the grey matter in our heads – weighing not even three pounds, I might add – remains a mystery to this day.

Another example, you might think, of us being able to use something without understanding how it works. Most of us experience the same thing with our microwave oven. But there's a fundamental difference between a layperson not understanding the scientific basis of an everyday technology. And experts not studying molecular vibrations and not discovering the magnetron. If that had happened, you'd still be warming your milk slowly and gently on the stove.

There is, though, a serious effect of scientists still not knowing enough about the human **brain!** Modern brain research does impress us with wonderful images. Not that you imagine you could now watch me thinking!

Images like these can show us a rough map of the active regions in the brain, but scientists are still working on understanding the actual processes involved in thinking. Later, **David Fitzpatrick** will be illustrating for us what insights the brain scans can actually give us. David is Director at the Max Planck Florida Institute for Neuroscience.

Our brain is where thinking, acting, remembering and feeling is rooted. Errors in this complex system affect the whole person: as in diseases like Alzheimer's, Parkinson's and depression. As we sit here today, scientists are still not able to describe precisely what happens in patients' brains. And so there is almost no way of treating these conditions, which affect 160 million people in Europe alone.

Two major research drives cast a light on this topic earlier this year: In February, the American President announced a **Brain Initiative** in his State of the Union address. Around the same time, the European Union **launched the Human Brain Project**.

Here at the Max Planck Society the brain is a key topic for us, too. 10 of our institutes have a neurobiological focus, and 8 other institutes have departments working on brain-related issues.

That said, it would be wrong to think that fundamental knowledge for our understanding of diseases like Alzheimer's or Parkinson's came from neurobiology and nowhere else. **Ulrich Hartl** from the Max Planck Institute of Biochemistry, for instance, who studies the protein folding process, came across the key role of helper proteins known as **chaperones**.

Proteins that are wrongly folded and clumped in the nervous system are linked with Alzheimer's and Parkinson's. So **Hartl's** findings offer a potential approach that could lead to a treatment for these diseases.

Basic research often delivers surprising results and creates fundamentally new things: New things that change the world and that we soon cannot imagine our lives without. Just ask your children or grandchildren!

You may have heard the story of the father who was telling his six-year-old son: "When I was your age we didn't have computers". And the boy's response? "So how did you get on the Internet?" – Good question! Life without the Internet is just about inconceivable these days.

If you want to know something, all you need to do is read about it on the World Wide Web, follow the links to articles that go into it in more detail and you can look up words and phrases – unimaginable 20 years ago! And it's all thanks to basic research. In 1989 **Tim Berners-Lee** was working at the CERN research institute and developed the basis for the Internet we have today. But sometimes all this interconnectedness is too much of a good thing: When I see how some people sit there **multitasking** on their smartphones: working, chatting, texting, e-mailing – and listening to a speech at the same time...

Billions spent on funding programmes like the **brain initiatives** create an awareness of a problem, and they can help pool our energies. But big funding programmes only make sense if they are designed and coordinated bottom-up, by the best scientists and researchers we have.

And it's also important that this outside funding does not come at the expense of basic funding. After all, **Ulrich Hartl** would never have applied for money for brain research!

In Germany these days, research – especially at the universities – is suffering from the fact that ever-greater swathes of its budget are being covered by project and outside funding. It's time to rethink the balance! There's money in the system, but it takes courage on the part of policymakers and administrators to release it. And the universities need the courage to make their structures more efficient where necessary!

At the moment, policymakers are awaiting a **Science Council recommendation** on how to take things forward after the successful Excellence Initiative in Germany. Following on from 8 years of additional money pouring in and the German science system changing in part, now is a good time to consider how we can sustainably take what has been attained to the next level.

To do this we need a fundamental analysis of the entire system. What contributions are coming from the individual players in the science system? What quality standards do they meet?

I'm not talking about a revolution in the system! I firmly believe that the structural split of universities and non-university research institutions makes sense.

But a national commission like the Science Council's working group should not be called upon to perform an overarching analysis which might have unpleasant consequences.

This goes for the scientists involved and for the policymakers in at least equal measure. A neutrality is being asked of them that they simply cannot have owing to their role in the system!

This is a task that calls for a high-level international commission of scientists and science managers. The analysis could be designed along the lines of the system evaluation of the DFG and the Max Planck Society that took place 15 years ago. Then it was just such an international commission that examined research in Germany with a focus on our two institutions and their role for the universities. The resulting recommendations helped us to focus our mission and to refine our role in the German science system.

A similar analysis was recommended by the then-commission for the Helmholtz and the Leibniz Association. The prevailing ratios of **basic research, programmed research** and **government-funded research** would be an interesting subject for analysis here, too. Or the question of what quality criteria are applied in funding decisions.

The outside perspective is so important because **science is global**. Thanks to the mobility and the communication speed we enjoy, scientists are cooperating across ever-greater distances. What matters is that the partner does outstanding research that you can benefit from yourself. What matters is quality.

In science the **competition is tougher** than in any other sector because there is only one product. On the world market you can sell no longer state-of-the-art cars for a lower price and you can still do good business. In basic research each new insight is only new and relevant once. What matters is who makes the big breakthrough. It's this person that deserves the recognition, maybe even a Nobel Prize.

Breakthroughs can change our world and challenge us. **Barack Obama** has compared his brain research initiative with the decoding of the **human genome**. That knowledge about our genes had and continues to have enormous repercussions.

I'm sure you've all been following the news about **Angelina Jolie**.

Having undergone genetic testing, the actress found that she carries a **mutation of the BRCA1 gene**. A mutation that raises the risk of getting breast cancer at some point in life to about **65 percent**. For Angelina Jolie the risk was even as high as 87 percent owing to individual factors. She drew the necessary conclusions and had the at-risk tissue removed from both breasts as a precautionary measure. This example shows the extent to which new knowledge presents each one of us and our **society with new questions**. Should genetic testing be made compulsory? And how do we as individuals but also as a society deal with the results?

Breakthroughs in brain research will also throw up questions of this nature – an issue that our own Ethics Commission addresses. The answer cannot be the concern of natural scientists alone. Input must also come from the legal and social sciences and the humanities. Scholars from these disciplines need to provide scientific analyses to accompany the public debate on how we plan to deal with new knowledge and new possibilities.

Basic research is diverse. It can **serve society and the economy** in manifold ways. Sometimes the value lies primarily in the knowledge gained, sometimes an application possibility emerges years or decades later, while sometimes the benefit is seen almost immediately. But there is no doubt of one thing: Basic research creates innovation and innovation creates prosperity!

Barack Obama, too, is linking his Brain Initiative with the hope of well-paid jobs and corresponding economic output. He backs up his expectations with a calculation relating to the 3.8 billion dollar investment in the **human genome project**: Each dollar spent on that resulted in 140 dollars in economic output. Naturally not every investment in basic research automatically produces that kind of return! But spending the money certainly pays off.

So it's no wonder that **more and more nations** are establishing science and innovation centres. Korea – currently a leader in the investment stakes – is taking its cue from the Max Planck Society in establishing its International Institutes for Basic Science (or IBS) and is looking covetously at one or two of our Max Planck Directors as well. And they're offering a level of pay that we don't often see outside of the boardroom! As we all know, China and India are expanding their science centres, too, as is Brazil. And the Gulf States are preparing for the post-oil era.

Germany has invested in research in recent years. For the Max Planck Society, the Pact for Research and Innovation was a particularly big step forward. Because it meant that policymakers had given us planning security for the long term and protected our capacity for sustainable growth. And so my thanks go once again to the federal and state governments – represented here today by **Minister Johanna Wanka of the federal government**, and **state government Minister Sabine Kunst!**

Germany did indeed delve deep into its coffers for the Excellence Initiative, the Higher Education Pact and the Pact for Research and Innovation. But it would be foolish to believe that no more was needed.

World-wide spending on research and development rose 45 percent between 2002 and 2010 – according to a report by the Royal Society. Even if Germany is investing almost 3 percent¹ of its gross domestic product in research and development, that cannot be the end of it². That would be like putting the brakes on in the middle of a great leap forward!

R&D spending is an investment in our future – it's not a subsidy! We need to have the ambition to be among the top players in terms of research achievements! 3.5 percent of GDP is what we should be aiming for. Thank you, **Minister Wanka**, for setting this target and throwing your political weight behind it! For there's no doubt that the good of our nation, otherwise poor in raw materials, depends on us being able to mine the gold between our ears.

The **Max Planck Society**, too, is going to need further **budget increases** in the years to come. The rocketing costs of appointments, equipment, price rises, growing energy demand and infrastructures alone are currently swallowing up four percentage points of the five percent budget increase. And the money is well invested with us: The Max Planck Society has for years been second only to Harvard in the number of highly cited publications.

Ladies and gentlemen,

Excellence has a high price tag! It's about the best and the brightest minds and often expensive high-tech equipment. The inflation rate is not a valid point of reference. A four percent increase per year is the

¹ According to the GWK (Joint Science Council), spending on R&D in 2011 was 2.9%.

² We are in 8th place in the OECD's ranking of research spending measured against GDP. And even if we look only at government spending, the top group is led by Finland, Denmark, Iceland, Portugal and Korea.

absolute minimum we need to maintain the status quo. Each percentage point less means cutbacks for us.

A certain top German politician, a very well-known lady, would say the situation was **without alternative**: Germany must continue to raise its investments in research appreciably if it wants to sustain its innovative strength and its prosperity. **Minister Wanka**, it's not so much your boss we need to convince as the finance ministers of the federal and state governments...

The fact is that only further budget increases can give the Max Planck Society a real chance against the growing global competition. In particular the **competition for the best minds** is getting ever tougher. After all, the bitter truth is: The gold between our ears does not shine as brightly for everyone. Especially in basic research, it all revolves around a relatively small group of excellent scientists.

Incidentally, what makes the best so outstanding is still unknown. The many unexplored gyri of the human brain also hide the secret of creativity. For as long as we don't know how to produce creativity, the only thing we can do is promote exceptional talents as best we can and give them the best conditions for their capabilities to unfold.

The more money is invested in innovation world-wide, the more the competition for talent is ratcheted up – just like in football: And we all know there is only a limited number of **Messis** or **Özils** in the world ... And to really be at the peak of its game, a top club needs not just one player of this calibre but as many **Götzes**, **Riberys** or **Alabas** as they can lay their hands on...

This is increasingly true of young scientists as well. I think it's lamentable that the debate about student education in Germany is currently reduced to a discussion of finances. Much as I appreciate the need to consolidate! But we must not allow ourselves to see students as a financial problem! We need greater investment in research and teaching! Of course, the money has to come from somewhere.

I see **four possibilities**:

- Clearly setting the priority on education and research in the federal and state budgets
- Readjusting the distribution of revenue between the federal and the state governments.

If there is no scope for that:

- Raising taxes specifically for investments in education and research or
- At least reintroducing tuition fees.

It is a German peculiarity that we consider it more socially equitable for a physiotherapist or master craftsman to have to pay for their own training but for a doctor or engineer not to have to.

Regardless of how the decision falls in the long term, we need to educate our young people very well indeed. Because soon enough we will be pining for these days when young people were flocking to our universities in large numbers.

Given the effect of **demographic change**, our strength in research and innovation will in future hinge upon whether we can attract talented people from around the world. Relatively few of them will come from Germany. OECD forecasts predict that 40 percent of all university graduates will come from India and China within seven years.

Right now, there are about 4 million mobile students world-wide, with Germany some way behind the USA and the UK as the third most popular host country.

But what I consider more important is the question of whether the talented and capable students are really coming to Germany. Are we in third place or are we third class? And what criteria do the best young minds or even the scientists who've already arrived consider when choosing a country?

I'm sure that young people in particular base their decision first and foremost on **brands**. Just like with an Apple Computer, everybody knows what product they can expect from Harvard or Princeton. Try it yourself – what would run through your mind if you were told someone had studied business at Harvard or at the Technical University of Deggendorf? No offence to the dynamic university in the Bavarian countryside, but the promise of a career lies clearly with the established premium brands!

To keep themselves at the top, **US colleges are going down the internationalisation route**: What they want to do most of all is win the best and the brightest. For an American university, the extra revenue from tuition fees is an important economic factor that enables them to teach and research at the high level they are renowned for. And they want to shape the upcoming generation of host countries in the American interest.

And Germany?

We are currently at the top of the Champions League – especially in our traditional industries of mechanical and automotive engineering, and naturally in football. The Excellence Initiative created at least a Bundesliga of sorts in the research world. The profiling and formation of centres of excellence is a valuable development. But to be perfectly honest, this doesn't give Germany an internationally known university brand.

Furthermore, the **Max Planck Society** – along with the Fraunhofer-Gesellschaft – is one of the few **internationally known science brands** from Germany. We are keen to strengthen our brand name, Max Planck, not only in Germany but also, and above all, internationally: Through research of the highest quality and an international presence. If we succeed, Germany will profit, too.

An important element in our internationalisation strategy are the **international institutes**: Like the recently founded Max Planck Institute for International, European and Regulatory Procedural Law in Luxembourg or the Max Planck Florida Institute, which we inaugurated in December.

Founding an institute of this nature is a long-term, risky and expensive business, which we are reluctant to undertake. The Max Planck Centers at international research institutions have proved to be a **flexible** instrument. In conjunction with high-calibre partners we pool our forces on a given research topic – for instance with Princeton on the topic of fusion, or the Indian Institute of Science on software. The Centers are 50 percent funded by each partner for five years with the option of a one-off extension.

Centers can incorporate International Max Planck Research Schools, partner groups and research groups. As you saw in our film at the beginning, we now have 12 Centers in 9 countries.

Our motto is not only **present throughout the world** but also, and most importantly, **at home in Germany**. Because if we want to offer excellent basic research at Champions League level over the long term, we need to be **embedded** in an **efficient and well equipped national science system**.

The system, for its part, profits from our international visibility and our cooperation with local partners. There are some very good examples of where universities and Max Planck institutes work together at a location to provide international visibility in a given field: Such as mathematics in Bonn, demographics in Rostock and biology of ageing in Cologne.

Since the system evaluation 15 years ago, we have steadily enhanced our cooperation instruments with universities: From graduate education at the International Max Planck Research Schools, or IMPRS; to Max Planck Research Groups at universities; and Max Planck Fellows, in other words university professors who are given the opportunity to work at our institutes with their own equipment budget. There are many points where the Excellence Initiative was able to build on existing cooperations. Seventy percent of all successful clusters have at least one Max Planck institute involved. And clusters like grad schools, for their part, have given our relations with universities added impetus.

From my talks with Directors and a survey of the Sections I know that the cooperation with universities is seen in an overwhelmingly positive

light. But not every local cooperation brings the desired scientific added value. This is an important point, because cooperation costs time and money. So the question must always be: Who enriches or complements my research – not who is researching in my locality! Science is about quality, not promoting a location!

What's essential is for scientists to initiate and shape cooperative arrangements that meet their needs. And that, in turn, means refraining from administrating inflated structures, and performing science-led work in flexible research structures. This is the only way for internationally competitive basic research to function smoothly. Then the location benefits and the German science system can make progress of real quality.

Today in the Senate we discussed two other instruments of the Max Planck Society. The idea is for Max Planck institutes and universities with a high profile in a certain research field to collaborate on an even closer and more structured basis. This will enable us to create internationally visible research centres.

For one thing, we looked at how we could take our concept of the international **Max Planck Centers** forward. And we are also keen to add university partners in Germany to our cooperations with the top institutions abroad – where scientifically reasonable and desirable.

Some German universities are already participating in our Max Planck Centers, especially when International Max Planck Research Schools form part of the research programme. By linking this internationalisation strategy with our university cooperation concepts, our aim is to help to advance Germany as a location for science. In future it will be possible for new Max Planck Centers to emerge straight out of a cooperation between at least one Max Planck institute, a

German university and an international research partner. International partnerships should continue to be the rule but Max Planck Centers with only German partners will not be out of the question – in the start-up phase for example. In both cases, key research activities of the Max Planck Center can be located in Germany – on one condition: Fixed-term research funding must be made available from the federal budget for the German part of the Center – especially but not only to support the German university's share in the endeavour.

Proven instruments will continue to be used under the umbrella of these Max Planck Centers: IMPRS, Fellows, junior research groups and so on. We are also keen to have provisions in the cooperation agreement with German universities regulating aspects like how young Max Planck scientists can become involved in teaching and supporting doctoral students or what career opportunities the university can open up for them.

As such, the university gains ambitious young scientists and we all gain outstandingly well-educated graduates! Since the Center's work will be exclusively science led, the key scientists will decide which partners they will collaborate with where in the world. In my view, this is likewise an important guarantor of quality.

There is another instrument in the form of a Max Planck professorship. Max Planck Professors will be appointed in accordance with our excellence criteria to work at a university – closely linked to a Max Planck Institute. The professor will enjoy an equipment budget comparable to a Max Planck Director. The professorship could also be part of a Max Planck Center. This is another model that represents a refinement of an existing instrument.

So as you see, we are not only bringing in our scientific expertise, we are also utilising our longstanding experience with instruments suited to basic research.

Of course we will first discuss the shaping of these flexible, fixed-term instruments with our partners. After all, it is well known that any cooperation has to be based on two or more equal partners.

So what will the university, the Max Planck Society and Germany as a location gain?

Basic research will profit first and foremost, as science-led funding would be invested in flexible and efficient cooperative structures. Research efforts will be pooled and thereby strengthened.

The location will benefit from the Max Planck brand and the university's profile, enabling it to attract the best talent from around the world. The instruments combine two products ***made in Germany*** – Max Planck and the university – with the common aim of:

Science at Champions League level – no more, no less.

I firmly believe that for the future of this country we need basic research that is internationally competitive!

Minister Wanka,
Minister Kunst,
ladies and gentlemen,

We hope to have your support!

Let us take the successes of the Excellence Initiative and the Pact to another level together and start something new!

Thank you!

You will now hear more about the gold between our ears – which will come into its own in this endeavour – from **David Fitzpatrick**, Director at the Max Planck Institute for Neuroscience.

David, after the film clip – the floor is yours!