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science stories

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University of Zurich[UZH]

European Science Stories

Dear Reader

Michael Schaepman, Sofia Karakostas, Agatha Keller and Detlef Günther

As you are reading the third edition of our Science Stories 2018, preparations for the next EU Research Framework Programme Horizon Europe (2021-2017) are in full swing in Brussels. Signs are good that the prestigious and very popular European Research Council (ERC) Grants programme will again play a prominent role. This is good news for our scientists, who participate very successfully in this programme. You can learn more about the ERC on the last page but first, we would like to present three of Zurich's ERC success stories in this issue:

An ERC Starting Grant gave Florian Scheuer, Professor of Economics of Institutions at the University of Zurich, a head start when he took up his position in Zurich. This funding allows him to immerse himself into research subjects that are closest to his heart: What are the values that top incomes generate? Can a robot tax cushion negative consequences of the rapid automation and globalisation in our economy? How can tax policy stimulate equal opportunities?

Petra Dittrich, Associate Professor for Bioanalytics at the Department of Biosystems Science and Engineering of ETH Zurich, thinks that the ERC is the best possible funding scheme at this moment. And she must know it, because she has already received two ERC grants during her career. An ERC Starting Grant provided her with independence and freedom at assistant professor level. Now, the Consolidator Grant gives her the space to embark on the new and exciting topic of engineering hybrid cells using lab-on-chip technology.

The ERC Advanced Grant awarded to Raji C. Steineck, Professor of Japanese Philology at the University of Zurich in 2017, enables him to perform research in a way that is not usual in his field: assembling an interdisciplinary and international team of experts with diverse backgrounds to explore a subject within a common framework over five years. This team studies the concept of time in medieval Japan with the help of four case studies: Zen, courts, market and body time.

The ERC continues to be the singular best chance to acquire funding for fundamental research. We encourage everyone to pick up the chance and submit proposals to the ERC. The award of getting one of these grants is priceless: fantastic and groundbreaking research!

We wish you an exciting read!

Michael Schaepman

Vice President Research
University of Zurich

Detlef Günther

Vice President Research
and Corporate Relations, ETH Zurich

Sofia Karakostas and Agatha Keller

Co-Heads EU GrantsAccess

Florian Scheuer explores whether top salaries are of benefit to the poorest

Higher taxation of top salaries that hardly create any social values and of robots that destroy jobs? Florian Scheuer, Professor of Economics of Institutions at the University of Zurich, assesses novel tax systems in an ERC project to control the growing inequality of income.

His career path was influenced by two events: the financial crisis in the years 2007 and 2008 and the time when the tissue of lies of New York's financier Bernard L. Madoff was busted. In those days, Florian Scheuer was basically at the source of the blaze. Between 2005 and 2010, he conducted tax policy research at the Massachusetts Institute of Technology (MIT) in Boston. MIT economists were little worried about the financial crisis at that time. «We believed that the Federal Reserve Bank could solve the problems of the banks concerned with a few technical interventions,» the 38-year-old Professor of Economics recalls the general atmosphere at the MIT ten years ago. Neither the established economy professors nor their students could possibly imagine that the collapse of the first financial institutes would be the initial domino to fall, knocking down within only a few months the state finances of numerous countries and the real economy and leading to severe unemployment and a fall in GDP in many countries. «Back then, economists were convinced that they had essentially solved the question of how to ensure stability.» However, reality proved them wrong. They had to realise that their models did not work, that they had thought themselves safe when they were not. «This came as a shock for many of our teachers,» Scheuer remembers. For the young MIT students, in contrast, the financial crisis triggered a burst of energy. «We knew that novel approaches were needed – we knew that we were needed now.»

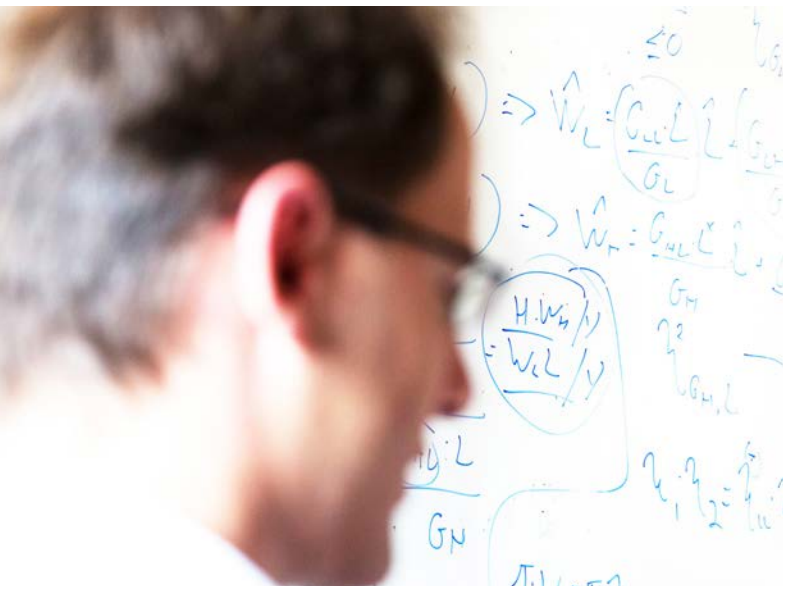
A question of justice

In late 2008, the German PhD candidate also followed with great interest the collapse of Bernie Madoff's Ponzi scheme. Said financier had set up an investment firm, promised continuous great returns to his investors, yet never invested their money. His former investors were paid by returns from the new deposits. Madoff's system crashed as part of the financial crisis. More than 4,800 people from over 20 countries lost their money; millionaires, foundations, workers who had put their entire pension funds in the Madoff scheme. It was the first huge global fraud case. Madoff received more than a life sentence: 150 years in prison. «The severity of the penalty shows the immense damage he's caused,» Scheuer says.

> «We knew that novel approaches were needed – we knew that we were needed now.»

Scheuer grew up in the Black Forest region, the son of teacher parents. He's been fascinated by questions of justice and equality ever since his adolescence. Already as a student at the gymnasium he contemplated the future of social insurance in view of the demographic

4 / florian scheuer explores whether top salaries are of benefit to the poorest



development or the unemployment rate triggered by automation. He decided to study economics because he wanted to understand economic and political relations and find solutions for the social problems caused by economic activities. «Many concerns that society has to deal with can be traced back to economic problems,» Florian Scheuer states.

What are the social values that a top manager creates?

The economy does not act for itself but for society as a whole. This was already pointed out in the 18th century by the Scottish moral philosopher, enlightener and economist Adam Smith. The father of modern free trade stated that it was the economy's duty to enhance the welfare of society, therefore of all people. The Madoff case as well as the «astronomically» high income of top executives, which have increased «drastically» in many countries over the last three decades, prompted Florian Scheuer to ponder on novel tax models. First, the economist asked about the benefit of these top incomes for society as a whole and about the values they created for society. Scheuer perceives himself in the tradition of John Rawls, an American liberal justice theorist whose principals of social justice were guided by the least advantaged members of society. One of his principles correspondingly states that social and economic inequalities are only justified if the least advantaged receive the greatest benefit. Or, in other words: The prosperity of the poorest must increase visibly once the rich people get richer. Scheuer is now analysing which high incomes serve social welfare and which ones are to the disadvantage of many. Surveys in the United States, for example, indicate that some high-paid investment bankers hardly create any social value at all. They are strongly overpaid.

> Surveys in the United States indicate that some high-paid investment bankers hardly create any social value at all. They are strongly overpaid.

Good kindergarten teachers, by contrast, are massively underpaid; measured against the social value they create, they should be paid about 300,000 dollars a year.

ERC project: Development of fair tax models

Scheuer reflects upon tax systems that not only help to rectify such injustices but that create incentives in the long run so that future (university) graduates will increasingly consider professions that create social values: that is, for example, that there will be more young teachers than investment bankers.

To help reduce the growing inequality by means of fiscal policy is a matter very close to the heart of the calm and considerate economist. For this, Scheuer – who moved from the prestigious Stanford University to the University of Zurich in 2017 as a «UBS Professor of Economics of Institutions» – received a Starting Grant of the European Research Council (ERC). ERC Starting Grants promote promising young scientists. The altered conditions of the employment market are in the foreground of the ERC project that started at the beginning of this year and will span a course of five years, funded with one million euros. Scheuer explains that most tax systems try to reduce income inequality by means of redistribution. He plans to address the income directly and measure the amount of taxation by the social value of the professional activity.

Scheuer approaches inequalitiy from three different angles. First, together with his team, he analyses how high incomes come about in the first place, whether they for instance enhance both the personal and the social prosperity. In obvious cases, if income is achieved at other people's expense – as is often the case in the financial sector – then it is time for a change, according to Scheuer. This injustice can be rectified by imposing a considerably higher tax on these incomes.

Robot tax

The second focus of the project is on the increasing automation and globalisation, which elevate capital incomes but destroy jobs, namely those of the so-called middle class. Once these jobs disappear, there is a massive drop in tax

ERC Starting Grant

«IneqPol: Inequality – Public Policy and Political Economy»,

Duration: 2018-2023

Financial contribution from H2020: 1,008,665 €

Florian Scheuer

Florian Scheuer is Professor of Economics of Institutions at the University of Zurich, endowed by the UBS International Center of Economics in Society. He was previously Assistant Professor of Economics at Stanford University, a Visiting Professor at Harvard University and UC Berkeley, and a National Fellow at the Hoover Institution. He holds a PhD in Economics from MIT. Scheuer's research connects the fields of public finance, economic theory, macroeconomics and political economy. In particular, he has studied how rising inequality affects various aspects of optimal tax policy and vice versa. His work has been published in the American Economic Review, the Journal of Political Economy, the Quarterly Journal of Economics and the Review of Economic Studies, among other journals. In 2017, he was awarded an ERC Starting Grant for his project «Inequality – Public Policy and Political Economy.»

revenue. Making the necessary adjustments for such great changes takes time, often two generations. Scheuer examines whether a kind of «robot tax» could serve as a useful transitional instrument, «to guide us through the period of adaptation.» Robots would be taxed higher than other forms of capital, which would slightly slow down automation and cushion its negative consequences. Scheuer, however, does not consider this tax to be a durable solution as it may hinder technological developments. South Korea, market leader in many areas of technology, has recently introduced such an approach.

The third emphasis is on how inequality is passed on to the next generations and how equal opportunities can be prompted by means of tax money, for example by increased funding of education and training or a basic income. Personally, he does not believe that a basic income can solve the problems. «People want jobs, no transfer benefits,» he states.

> «We can try to direct the greed for profit into the right channels, so that ultimately it creates something good.»

Several studies have shown that work itself contributes far more to people's life satisfaction than government transfers, as it gives them structure, recognition and prestige as well. In Scheuer's view, however, education and training are the main tools people need to be able to adapt to these dynamic changes, especially so in times when most cannot bank on life-long positions and technological developments destroy jobs. «We must invest in education to achieve equal opportunities,» Scheuer is convinced. Finally, the team wants to show with this project how wealth inequality and political influence are interrelated.

Back when Scheuer applied for an ERC Starting Grant, he was still an Assistant Professor at Stanford University. «When we learned that we would have twins, we decided to move back to Europe,» Scheuer recounts. In Zurich, the economist was able to start his professorship with the ERC project ready. He is glad about the financial support by the EU, as it permits him to tackle a long-desired research project and, additionally, hire the specialists needed for it. He already employs a postdoc dealing with robot taxes; a second postdoc position is planned for this year. «Without the ERC, this would not be possible.»

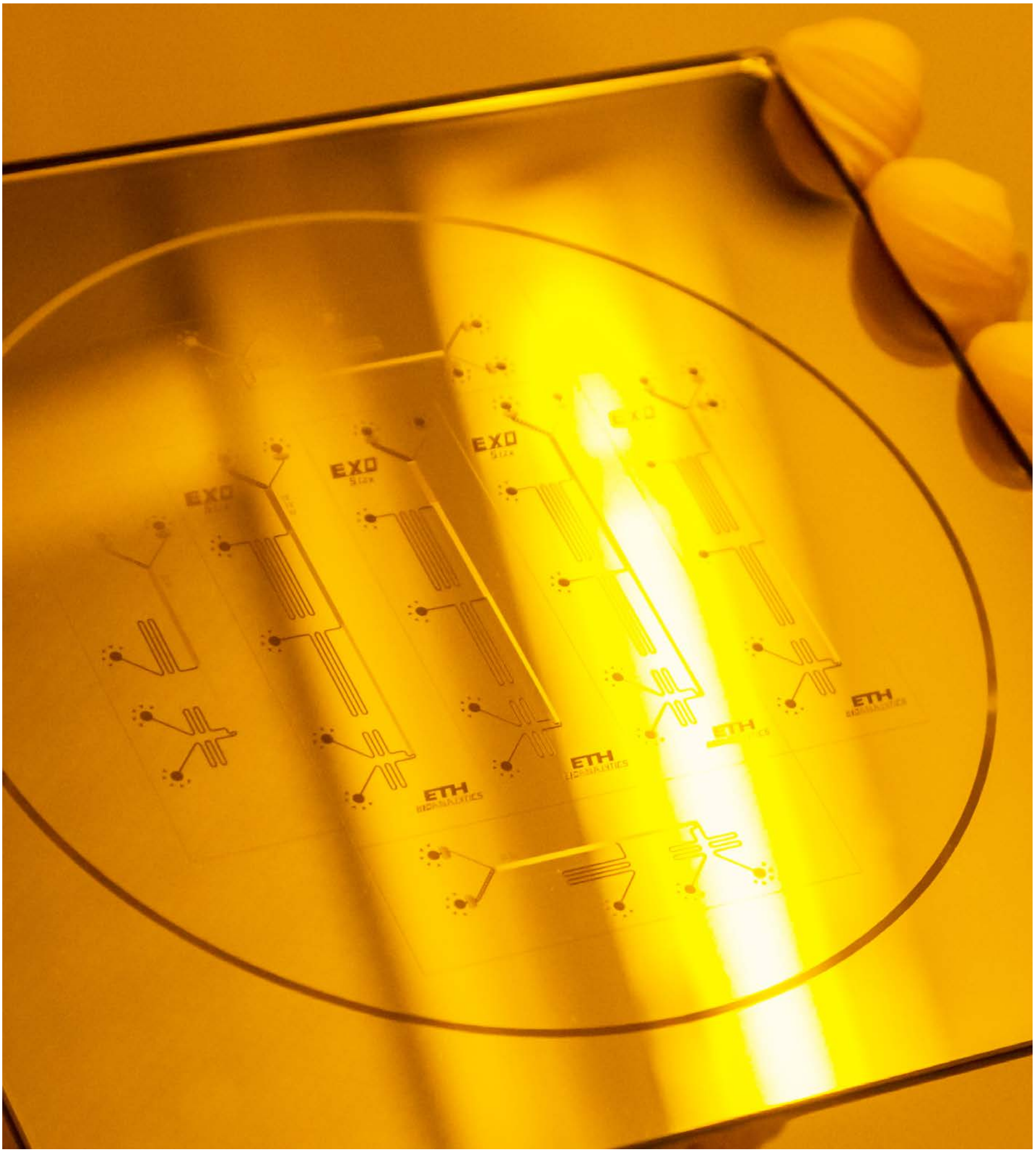
Any lessons learnt from the financial crisis?

Did the economy learn from those events? Scheuer says that the financial crisis had a great effect on scientific research. He also believes that economists have become somewhat more humble: «They no longer believe to have everything under control.» He does not dare to evaluate whether the real economy and politicians have learnt from the financial crisis; yet, he has his doubts. Matter-of-factly, he establishes that at least in the USA many government regulations have been repealed since Trump's accession to office.

During the past ten years, the term «greed for profit» was the noun most often used by the media when describing top managers. Florian Scheuer does not count on more modesty. «People will always want to see what's in it for them.» Trying to teach them more morality, in Scheuer's opinion, is not a fruitful path to follow. «But we can try to direct this greed for profit into the right channels, so that ultimately it creates something good.» Adam Smith believed that the government did not need to overly intervene in economic actions, that an «invisible hand» would guide everyone towards greater prosperity. Smith was wrong. According to Scheuer, studies prove that it is precisely the laissez-faire economic policies that lead to injustices. The government must intervene again more effectively in a corrective and regulative manner. More state intervention as opposed to even more deregulation. Has this realisation already been understood? Scheuer says that increased government involvement is beyond debate in today's economic world. «We will see whether politics will take these new findings seriously and implement them. At any rate, banks and companies that gained from the deregulations during the past decades will certainly invest greatly in lobbying.»

● Denise Battaglia

Interview clip:
www.grantsaccess.ethz.ch/en/sciencestories



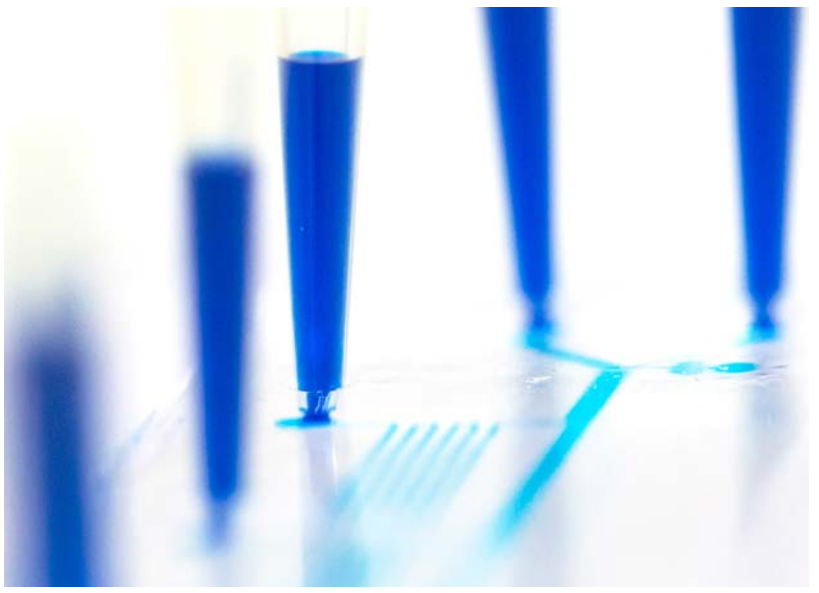
The art of creating artificial cells

An interview with Petra Dittrich, Professor for Bioanalytics at ETH Zurich.

About the smartness of cells, the challenge of copying them and the crucial impact of an ERC Grant on the career of a scientist.

Engineering of hybrid cells. How do you explain to your 11-year-old son what you are doing in this project financed by an ERC Grant?

I would say: Look at your body. It consists of millions of tiny cells. Your skin, your heart, your blood, all is made of cells. Cells are the smallest units of life. They live. They can produce molecules, eat molecules, change molecules and use molecules for their own purpose. With our project we want to learn how cells can do all these fascinating things and at the same time we would like to copy them. We wish to build artificial cells by ourselves that have at least some of the amazing capabilities of natural cells. But in order to build artificial cells, we need specific molecules that natural cells also consist of. These molecules are called lipids. We use them to form a small vessel shaped like a little ball or a balloon. Into this ball, we pack everything a cell needs to perform certain activities. The shell of the ball, a tiny membrane of lipids, is strong enough to keep all the cell molecules inside. So, the aim of our project is to learn how to build such artificial cells and how to make them work for us.



Petra Dittrich

has been Associate Professor for Bioanalytics at the Department of Biosystems Science and Engineering BSSE of ETH Zurich since 2014. The BSSE Department is located in Basel. Her research in the field of lab-on-a-chip technologies focuses on the miniaturisation of high-sensitivity devices for chemical and biological analyses and microfluidic-aided organisation of materials. She studied chemistry at the Bielefeld University (Germany) and the Universidad de Salamanca (Spain) from 1993 to 1999. In 2003, she received her PhD degree at the Max Planck Institute for Biophysical Chemistry in Göttingen (Germany). After another year as postdoctoral fellow at the Max Planck Institute, she held a postdoctoral position from 2004 to 2008 at the Institute for Analytical Sciences ISAS, Dortmund (Germany). For research stays, she was at the Cornell University in 2002 and the University of Tokyo in 2005. In 2008, Petra Dittrich was nominated Assistant Professor for Bioanalytics at the Laboratory of Organic Chemistry of the Department of Chemistry and Applied Biosciences at ETH Zurich. Petra Dittrich received an ERC Starting Grant in 2008 and an ERC Consolidator Grant in 2016.

How do you manage to build such artificial cells?

We fuse artificially produced lipids and lipids from a living cell. The result is a hybrid cell, partly artificial and partly natural. The production of such cells, however, is a big challenge. You can bring lipid molecules together, but they will not form a ball just by themselves. Here, our technology comes in. It is called lab-on-a-chip technology and this is the second aspect of our project. We develop little devices or «microchips», which enable us to form these little lipid balls and produce artificial cells. The devices also help us to position the cells, to monitor them, to watch them under the microscope to see what is happening.

What will you do with these artificial hybrid cells?

Like our natural cells they can produce molecules, they communicate with each other and they can detect and identify molecules. So, we try to stimulate biochemical reactions within the hybrid cells similar to processes that would also take place in a natural cell. They work like a bioreactor producing peptides and proteins very efficiently.

And what is the benefit of hybrid cells compared to natural cells?

They work for us, producing or detecting molecules, but they do not live. They do not grow, do not divide and do not reproduce. We only add those elements from living cells into the hybrid cells that are required to get the expected result. We don't want to create artificial life. As we focus on one specific reaction or process, there are no or not many side reactions and consequently, we can observe the selected aspects in a much clearer way.

What is the aim of your ERC project?

The overall goal is to invent methods that are generally useful for the construction of artificial hybrid cells in a controlled way for producing or sensing molecules. At the same time, we learn how cells are doing just that and how the compartments in the cells cooperate. We find out which ones of the components are required; for example, which type of lipid is essential. To achieve these goals, we constantly have to adapt and develop our lab-on-a-chip devices and biochemical methods.

Which practical applications could the results of the project produce?

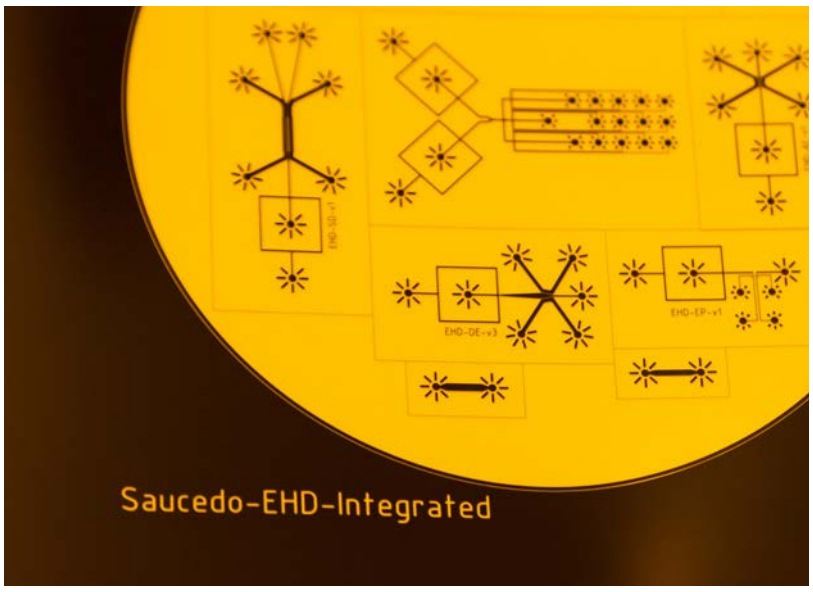
One application are biosensors, which are extremely sensitive to certain molecules. They work like a natural cell, where a molecule – the ligand – binds to a receptor protein in the membrane. Our sensors are not alive. They can be inserted into little instruments, e.g. little diagnostic chips, to detect biomarkers and thereby collect information from inside our body.

> We wish to build artificial cells that have at least some of the amazing capabilities of natural cells.

They can also be used for pharmaceutical or medical applications like drug screening. The current methods are commonly based on cells or cell cultures. Replacing natural cells by artificial hybrid cell systems would have many benefits in terms of reduction of laborious work, reliability and reproducibility.

And what are the main challenges you are facing?

Our lab-on-a-chip devices are very established and we are really good and experienced in building them. Now we are facing the challenge that cells are very complex. We can already fabricate simple models, but it is indeed very demanding to make them more sophisticated,



more like a natural cell. It is stunning how a living cell organises its architecture on its own. We have to work hard for it to create a simplified model.

What fascinates you so much about your project?

Its interdisciplinarity between cell biology and engineering. Engineering is very result-oriented, we achieve the goals by inventing the required technology. But it is also very creative to design and build the lab-on-a-chip devices. And then it is great to see that they work. These new methods based on lab-on-a-chip devices are unique and help us to increasingly understand how cells operate and how they behave in different environments.

Let us talk about the ERC Grant again. What motivated you to apply for a Consolidator Grant?

I already received an ERC Starting Grant in the very first call and greatly enjoyed the freedom I had thanks to this funding. As I believed that my new project is important, has great potential for the future and will have an impact on different fields I was convinced that I had fair chances to receive a Consolidator Grant. Therefore, I applied. It was also the right moment for me regarding the stage I had reached in my career. I applied for the ERC Starting Grant just before I became assistant professor. After the step to associate professor, I applied for this Consolidator Grant and received it.

For a researcher, what are the main benefits of an ERC Grant?

In a nutshell: independency and funding over a long period of five years. When I applied for the Starting Grant, I was a postdoc embedded in a larger group. But I really wanted to prove to myself that I could do research independently and that I was able to do this without any supervisors. I strongly wanted to realise my own ideas and also supervise students and PhD students. So, I think an ERC Starting Grant really gives you the freedom to try out things but also to prove yourself at an early stage.

> It is stunning how a living cell organises its architecture on its own.

I was already independent when I received the ERC Consolidator Grant. There, I need it because it gives me the freedom to address new topics and move in a certain direction. I can explore this direction for the next few years and, together with my team, concentrate specifically on this project for some time. And of course, it is also very prestigious.

Did you get any help when you applied?

The support from the EU GrantsAccess office was extremely helpful as they are very experienced and know exactly what must be considered. For example, I appreciated the help to set up the budget. I was insecure, say, about whether I should rather apply for postdocs or PhD students and they helped me to find the right answers.

Would you recommend applying for an ERC Grant?

Absolutely.

Even though it requires much bureaucracy?

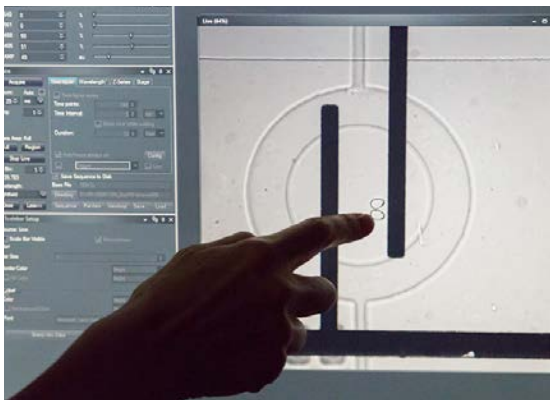
Oh no, there is not too much of bureaucracy. Considering the size of the grant you receive, the amount of financial and scientific reports you have to write is quite reasonable. And you always receive support by the EU GrantsAccess office. It is clearly the best funding scheme you can get at the moment.

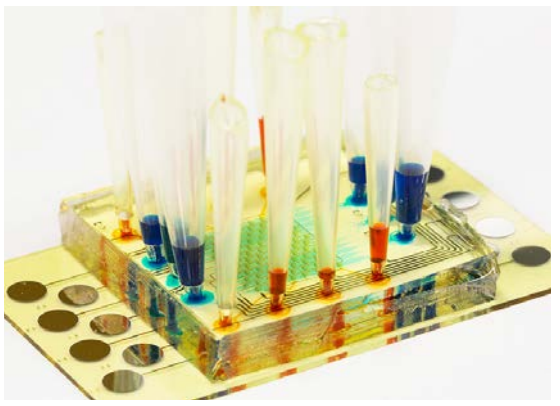
You are a professor at BSSE based in Basel. How is the scientific environment there?

The BSSE hosts research groups with background in experimental biology, bioinformatics and engineering. It is very inspiring to work in an institution where you have all these different disciplines under one roof. We have for example a «science lounge», where we can meet for exchange and discussions. Interdisciplinarity sounds great, but it is indeed challenging. It takes time to understand the concepts and the language of the other disciplines. It is unusual that you sit together, immediately come up with the greatest ideas and you have a success story the week after. It is a process, for me and particularly for new team members, which takes a while. But it is extremely enriching. For instance, we

Lab-on-a-chip

is a little device that integrates one or several laboratory functions on a single chip the size of millimetres to a few square centimetres. Lab-on-a-chip enables to manipulate fluids very precisely in tiny volumes of nanolitres or picolitres which cannot be handled with standard lab equipment like pipets. The devices open the way to novel analytical approaches in many different areas such as the examination of cells, cell cultures or tissues, the manipulation of tissue and for diagnostic purposes like blood analyses.





Engineering of hybrid cells using lab-on-a-chip technology

To learn about the fundamental characteristics of cellular organisation and compartmentalisation, in particular the role of lipid membrane, and to exploit this novel knowledge for engineering minimal cells so that they have both a great impact in the context of synthetical biology and also for pharmaceutical and medical applications.

ERC Consolidator Grant

«HybCell: Engineering of hybrid cells using lab-on-chip technology»

Duration: 2016-2021

Financial contribution from H2020: 1,971,250 €

Concluded FP7 projects:

ERC Starting Grant «nmu-LIPIDS: Biomimetic Lipid Structures on Nano- and Microfluidic Platforms»

Duration: 2008-2014

Financial contribution from FP7: 1,941,000 €

Collaborative project «ROC: Radiochemistry on Chip»

Duration: 2008-2011

Financial contribution from FP7: 218,314 €

Partners: 6 institutions from 5 different countries

had very good discussions here with microbiologic groups and that inspired me to increase efforts in this direction and made me realise the importance of this field. Moreover, I like the Basel area because we are also near the University of Basel and private companies who are engaged in engineering and method development.

What fascinates you so much about cells and bioanalytics?

I am a chemist by education, but at some point in my studies I realised that I am not the person to design and synthesise molecules. In organic chemistry you need these big devices and equipment to produce molecules. You have to purify the molecules again and again and go to the next synthesis steps and so on. I did not like that very much. But during my PhD time in a biophysics group, I realised that cells can produce molecules very smartly without these big apparatuses.

We don't want to create artificial life.

They don't have to purify the molecules in a process of many steps, they simply produce them in a very efficient way, while deviations from these biochemical pathways are the origin of diseases. This complexity in dimensions of a few micrometres fascinates me.

Life Science is a very dynamic field. How will it change our life in the years to come?

There is great progress in the fields of biosensors, implanted sensors, sensors in mobile devices like your cell phone. I think in the near future we will use these sensors for new types of diagnostic instruments in a much easier way than nowadays.

We want to be at the forefront, being the first to show that it works.

Constantly monitoring health and therapies is definitely a trend that is also related to our field. Another trend is what we call body-on-a-chip, trying to make functional tissues placed on small-scale devices and to use them to test the efficiency of drugs on a personalised level. You will see immediately if the drug works efficiently for you or how it is metabolised.

Ambitious researchers reach for the stars – what are you reaching for?

We want to leave an important and long-lasting imprint on our field, improve analytics and diagnostics. Regarding the ERC project with the hybrid cells, we want to be at the forefront, being the first to show that it works. And in a next step we wish to make it available to others so that, finally, people can use our hybrid cells.

● Interview: Rolf Probala

Interview clip:
www.grantsaccess.ethz.ch/en/sciencestories

The silent power of time

How the Japanologist Raji C. Steineck and his interdisciplinary team explore concepts of time in medieval Japan in a novel way and what we learn by this ERC project about our own perception of time.

«It's a once-in-a-lifetime opportunity to participate in this project,» says Georg Blind while we are walking to the refectory. Georg is a Japanologist, holds a PhD degree in Economy and had some years' experience as a consultant at McKinsey before he went back to academia. Two years ago, Raji Steineck, Professor of Japanese Philology at the University of Zurich, asked Georg to join his international team as senior researcher to work on the ERC project called «Time in Medieval Japan». Georg immediately agreed.

It's a cloudy day in late August on the campus of the Freie Universität at Berlin Dahlem. The sessions of the 17th German-speaking Japanese Studies Conference were halted for a noon break and I join Raji Steineck and members of his research team for lunch. They just presented their project for the first time to a broader audience on a panel session this morning and received great attention among the 350 participants of the conference. Now, sitting at a large table in the refectory, I ask Georg as well as the other team members Kohei Kataoka, Etienne Staehelin and Daniela Tan, what it is that fascinates them about working on this EU-financed project. They all agree: «It is about being part of an interdisciplinary international team pursuing a common aim, applying a common methodology and having the means and the funds to stick to research on a most exciting topic for five years.» As a matter of fact, this kind of project is quite exceptional within the humanities.

> Time is a fundamental condition of our human existence, which goes far beyond Japanology.

Traditionally, scholars in this field tend to work individually, pursuing their own ideas and projects. «This has its benefits, certainly, but there are limitations as well,» Raji Steineck says while we choose our meal at the buffet. «For certain research subjects, you just need a larger group of different people with different kinds of expertise and training who are willing to cooperate, develop a common framework and then work with that framework for a certain period of time to solve a problem.»

Time in medieval Japan and beyond

«Time in medieval Japan» is such a research subject for Raji Steineck. «It is something that I have been wanting to do for quite some time. So, this ERC Grant offered me the great chance to create a research group that has a common motivation and is exclusively there to systematically explore this subject,» he explains. Hence, since September 2017, eight scholars – three PhD students, two postdocs, three senior researchers and Raji Steineck himself – have been exploring perceptions and concepts of time in the Japanese society between the 10th and the 15th century, covering the fields of literature, economy, religion, philosophy, history and medical history.

At a first glance, the topic sounds pretty exotic. So, what makes this project so exciting for scholars and also relevant to a broader audience? «Time is a fundamental condition of our human existence,

Time in medieval Japan

The project explores time in medieval Japan taking a new approach to historical articulation of concepts of time, based on the theory of symbolic forms. It will examine symbolic representations and social regulations of time in a civilisation that is often juxtaposed to contemporary, globalised modernity.

Aim: To disclose the specific cultural practices operative in the respective ways of negotiating and to achieve a more comprehensive, detailed account of human strategies in dealing with time. The results will be compared to the history of time in the Western world and integrated into a theory of symbolic forms of time.

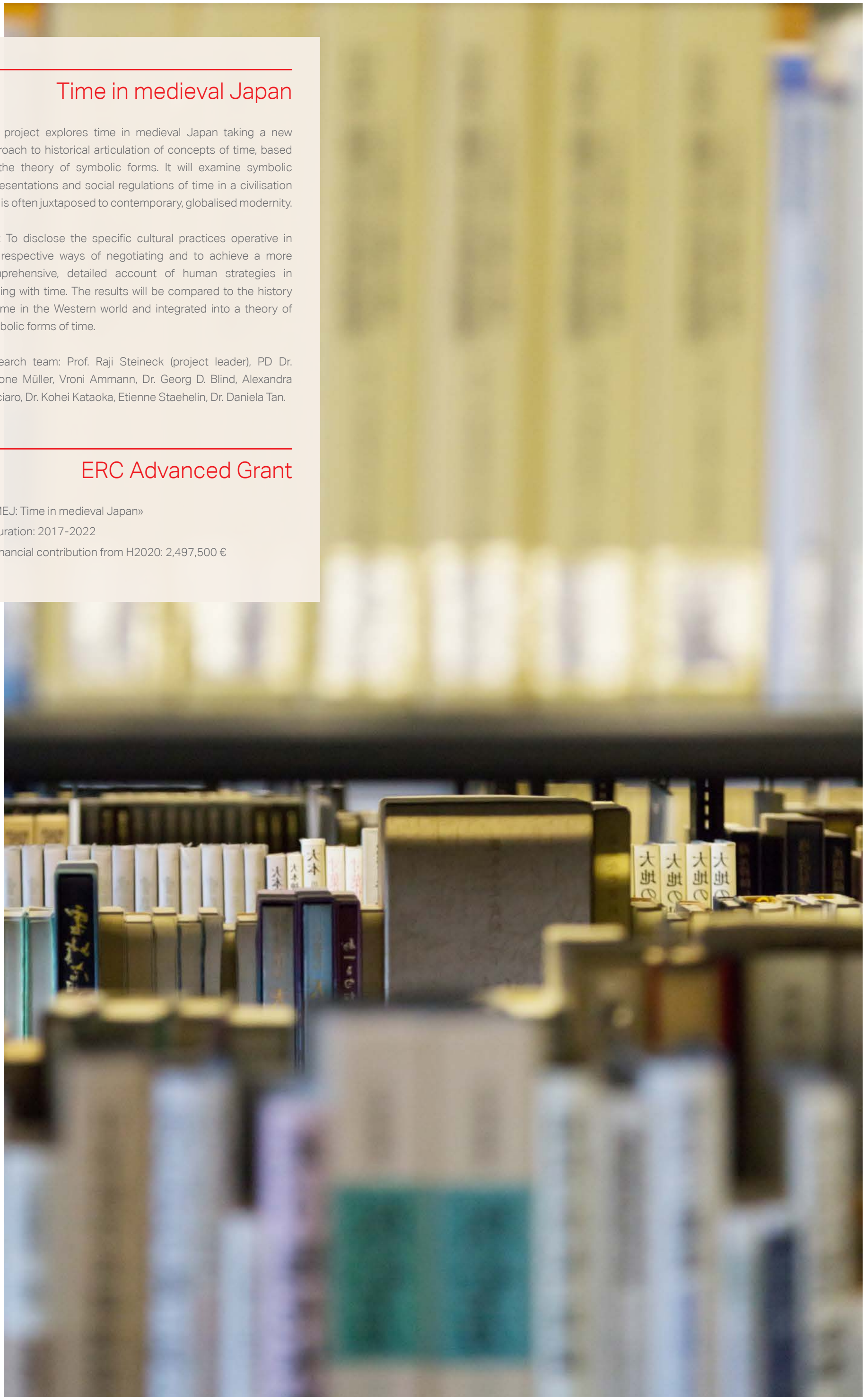
Research team: Prof. Raji Steineck (project leader), PD Dr. Simone Müller, Vroni Ammann, Dr. Georg D. Blind, Alexandra Ciociaro, Dr. Kohei Kataoka, Etienne Staehelin, Dr. Daniela Tan.

ERC Advanced Grant

«TIMEJ: Time in medieval Japan»

Duration: 2017-2022

Financial contribution from H2020: 2,497,500 €



which goes far beyond Japanology,» Raji Steineck replies. «Time is a coordinate system that we all use to order events and experiences in our life and world. In our modern Western society, we tend to look mainly at the quantitative aspect of time. Measurement and calculating are dominant in our time perception. But time has many other properties beyond clocks and timetables. By exploring time concepts in a premodern non-Western society like medieval Japan, we try to gain a better understanding of human strategies to deal with time and of the way time concepts are linked to social organisation. Finally, we hope to get a more realistic image of ourselves and our handling of time.»

Zen, aristocratic court, market – case studies in time perception

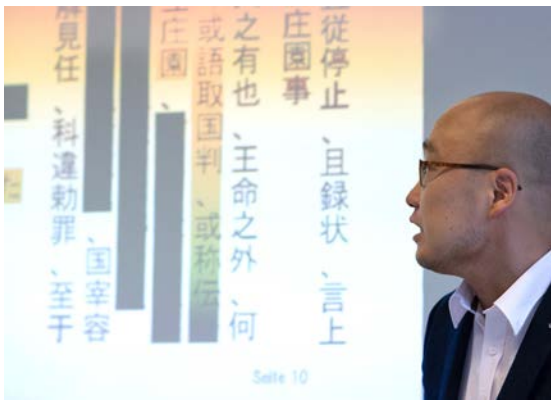
Raji Steineck and his team focus on three different spheres of the highly differentiated medieval Japanese society: the Zen monasteries, the female court aristocracy and the market. As a fourth connecting subject they explore the description of the female menstrual cycle under the aspect of body time addressed in medical documents but also in religion and literature texts of medieval Japan. Research work for Raji Steineck and his team means to search through hundreds of medieval documents and books for time expressions, to analyse usage, rules and properties related to time and to discover the underlying concept of time. Measuring and calculating time as well as exact dating play an important role in many documents, mainly when the texts are about contracts, economic topics and historiography. But many documents talk about different properties of time like moods, transience, beauty or eternity. Time of different properties produces different logics and rules, which might lead to conflicts between social groups following their prevalent concept of time. Therefore, in a highly differentiated society, time has to be negotiated to specify which kind of time on what occasion is valid for which section of society. As an example for how conflicting time concepts were managed in medieval Japan, Raji Steineck quotes a text from the famous Zen scholar Dogen, who was the abbot of a monastery in Kyoto during the 13th century. The monks of the monastic community live from donations they receive from individuals and aristocratic patrons. In a document, Dogen advises the monk in charge of the monastery's household on how to deal with a donation made for the purpose of buying rice for a community lunch.

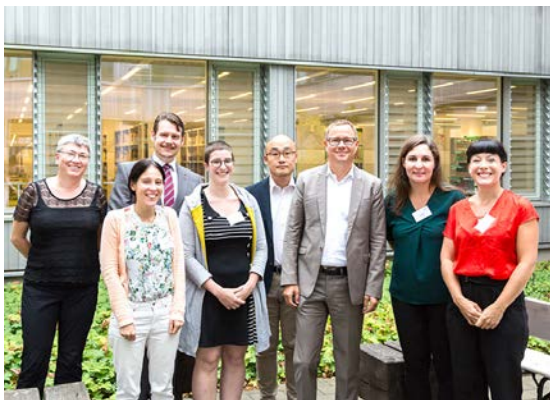
> Time has many other properties beyond clocks and timetables.

He should go to the market and buy exactly the quantity of rice at the day's price that is needed for the meal. If there is any money left, it has to be returned to the donor. The monk in charge is not allowed to keep it in order to spend it later or buy more rice and lend it to others for interest. What seems strange at first is a clear instruction on how to behave as a Buddhist monk when you are confronted with two different concepts of time. «As monks in a monastery, they perform the life of Buddha and the patriarchs and as such they operate on a different logic, a logic of eternity. Therefore, from his religious perspective, the abbot wants to make sure that the economic perspective, where you take care of your personal small life and the survival of your community, does not interfere with that larger perspective of eternity. Hence, you have to be very careful how you interpret this kind of conflicts. You need to see them in the logic of symbolic forms,» Raji Steineck explains. This leads us to the methodology he and his team apply on the documents and on their entire research.

Raji C. Steineck

has been Professor of Japanese Philology at the University of Zurich since 2008. He studied Japanology, Philosophy and Musicology, obtaining a Master degree in Japanese studies in 1993 and a PhD in Philosophy in 1999 at the University of Bonn, Germany. In 2006, he received the venia legendi in Japanology from the same university. During research for his PhD and later on as a postdoc, he spent a total of 28 months at Kyoto University, Japan. Between 2002 and 2006, he was back at the University of Bonn, working as a research fellow in the group «Bioethical Conflicts in Japan». During this period, he published a number of articles on topics such as the debates on brain death and human embryo research in Japan and prepared a monograph on notions of the human body in Japanese bioethical debates. In addition, he taught in the departments of Japanese studies and philosophy and was invited as a teaching fellow to Adam Mickiewicz University in Poznań, Poland, in 2004. From 2007 to early 2008, he was Professor of Japanese Intellectual History at the German Goethe University Frankfurt, before taking office as Professor of Japanese Philology in Zurich. In 2010, he became Director of the Institute of East Asian Studies at the University of Zurich and, upon formation of the Institute of Asian and Oriental Studies in 2013, one of its founding directors. Raji C. Steineck is an active board member of the International Society for the Study of Time and its President since 2012. In 2017, he received an ERC Advanced Grant for the project «Time in medieval Japan».





A common analysing tool

To detect how time is expressed, the team reads selected medieval documents very carefully and systematically. Additionally, the researchers also screen digitised texts from medieval times with computers to retrieve words referring to time. In such a text on Zen Buddhism, for example, they are assessing where and in which context the word «year» appears. «We then analyse whether time is expressed primarily in quantitative or in qualitative terms, whether it's mainly in a context of regulating time or contemplating time or in terms of attitude towards time.

> This kind of project is quite exceptional within the humanities.

We are trying to develop a fine grade of analysis of the way time is expressed in the various sources. From that ground we build up hypotheses about the way time was perceived, evaluated and regulated in different fields of society,» Steineck explains their working method. To analyse and distinguish the several «sorts of time» mentioned in the documents the team applies a common analytical tool based on three categories of time perception: Chronography is focussing on the way time is expressed in written texts. Chronometry, covering the quantitative aspects of time such as hours or dates, is just one part of Chronography. There are other ways of time perceptions as well. An evening can be expressed either by an exact number on the clock or by describing a sunset or a night of a full moon. Chronopolicy is about the regulation of time use. Mighty social groups like political elites intend to impose their time concept and their rules of time use on the entire society; hence, time becomes an instrument of power. In order to prove their legitimacy, elites create historiographies and genealogies to show that they are rooted in a long tradition. Chrononoetics finally deals with the concepts of time and the larger forms in which they are expressed (poems, religious texts, etc.).

The overall layout – theory of symbolic forms

Having categorised the data, the team then starts formulating and testing hypotheses about time, based on the theory of symbolic forms. It basically says that in a society there are different «fields» such as religion, art, law, economics, etc., with different values that guide people in their behavior*. Raji Steineck emphasises the significance of the theory of symbolic forms for the project as a whole: «This theory is very important as an overall layout for our project because it states that you can best understand culture when you look at the various domains of validity that operate in a society and orchestrate what people orient themselves towards.»

* The theory of symbolic forms was developed by the German philosopher Ernst Cassirer (1874 - 1945). He published his *Philosophie der symbolischen Formen* in three volumes between 1923 and 1929. The research concept of the ERC project is based on a further development of Cassirer's theory by Raji C.Steineck in his book *Kritik der symbolischen Formen I: Symbolische Form und Funktion, Stuttgart-Bad Cannstatt: Frommann-Holzboog, 2014 (Philosophie Interkulturell, 3).*

There has been an academic dispute among scholars for quite some time about time perception and modernity. Some say that measurement and calculation of time primarily came up with the industrialisation in the West and stands for modernity. In premodern societies like medieval Japan people did not care about the quantitative aspects of time, they simply lived with natural rhythms of agriculture. Raji Steineck and his team want to show that medieval Japan in many aspects had a much more complex relation to time, far beyond days and seasons. They intend to prove that Japanese people in this era were very much aware of time, applying several concepts including quantification and dealt with similar sophisticated time-related topics as we do today. So, the ERC project also contributes to settle an academic dispute. In the meantime, we finished lunch and enjoy a coffee. Before Raji Steineck and his research fellows have to leave to join the afternoon sessions of the conference, I would like to know what motivates him most to work on this project. With a smile he answers: «We have a lot of theories which are established by Western scholars looking at Western sources, assuming this is a kind of universal model. I don't necessarily challenge the universality of these models, but it is important to test them. That is what good scientists are doing in the end. So, we try putting things to the reality test and, in my case, evidence is provided by Japanese sources.»

● Rolf Probala

Interview clip:
www.grantsaccess.ethz.ch/en/sciencestories

ERC: a success story for Zurich

Last year, the European Research Council (ERC) celebrated its 10-year anniversary as a European success story. What was initiated by the research community as a request to the European Commission for more resources to support fundamental research grew into an established instrument for ground-breaking frontier research. The ERC offers a platform for high-risk / high-gain research ideas that do not fit into the portfolios of the national funding bodies.

«The ERC is a funding scheme for scientists by scientists. The high-quality scientific peer review is key to the success of the scheme,» said Prof. Reinhilde Veugelers, Professor at Leuven University and member of the European Research Council, during her talk in Zurich in September 2018. This also shows in the selection of the experts: The panel members are chosen by the European Research council, who in turn choose the external experts for desk review in the second evaluation step.

The ERC is also a success story for Zurich: Researchers of ETH Zurich and University of Zurich have acquired 90 individual ERC career grants in the current framework program H2020 (2014-2020). Some of the 34 Starting and 18 Consolidator grantees managed to obtain tenured positions in other institutions in Europe and have moved on. In turn, successful researchers with ERC grants were appointed in Zurich (see graph below). Petra Dittrich's (see interview in this edition) first ERC grant provided her with independency, long-term funding and the freedom to try new things. For many of the young researchers, the ERC can be a game changer, an entry point to their independent scientific career and a door opener for positions and collaborations.

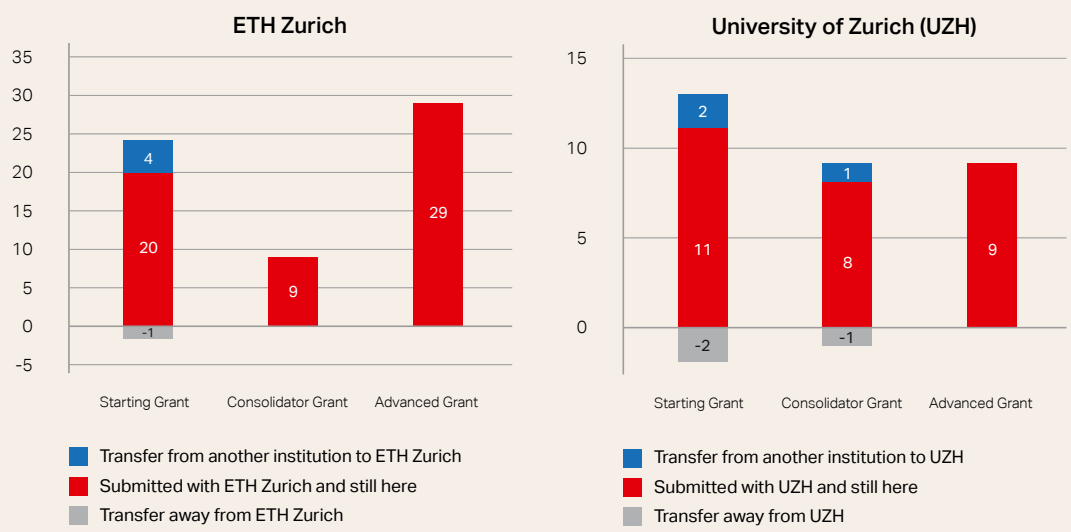
EU GrantsAccess supports applicants with their ERC submission throughout the process. We help our researchers reflect on the envisaged position in case of success, show them how to draw up a budget, assist with the struggle through the administrative forms and point out other institutional contacts they might need to approach. During our information events, they learn more about this funding scheme and can meet their peers, successful grantees and evaluators. Many times, it turns out to be a shared journey for a few months, which is very rewarding.

Prof. Jean-Pierre Bourguignon (President of the ERC)
Agatha Keller (Co-Head EU GrantsAccess)

Prof. Reinhilde Veugelers and Prof. Peter Egger during her presentation in Zurich

ERC career grants funded under Horizon 2020 at ETH Zurich / University of Zurich

(as of October 2018)



ERC Grant Schemes in Horizon 2020

Starting Grants
starters
2-7 years after PhD
(≥ 50% commitment)
up to € 1.5 M
for 5 years

Consolidator Grants
consolidators
7-12 years after PhD
(≥ 40% commitment)
up to € 2 M
for 5 years

Advanced Grants
track-record of significant research achievements in the last 10 years
(≥ 30% commitment)
up to € 2.5 M
for 5 years

Proof-of-Concept
bridging gap between research - earliest stage of marketable innovation
up to € 150,000 for ERC grant holders only

Synergy Grants New
2-4 PIs to lead to breakthroughs that cannot be achieved by a PI working alone
up to € 10 M for 6 years

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