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Edition 01 / 2016

ETH zürich

Universität Zürich[UZH]

European Science Stories

Dear Reader

Christoph Hock (l.) and Detlef Günther

It is fascinating to witness the vast number of opportunities Horizon 2020 (2014 – 2020) has to offer to scientists - this is exactly why we are happy to provide you with these Science Stories. Inside you`ll discover highlighted stories of and about scientists from widely different backgrounds and with varied motivations, all who applied for and successfully obtained funding for their projects and were thus able to realise them. Their individual stories illustrate the diversity of the EU Framework Programmes for Research.

There is the story of a young researcher named Ellen Jaspers, who completed her PhD at the Catholic University of Leuven in Belgium. In spite of a very low success rate and therefore a rather dim prospect of success, she focused on a Marie Curie Fellowship and with the support of ETH Professor Nicole Wenderoth was successful. Ellen Jaspers has been a Marie Curie postdoc at Wenderoth's lab for over a year now and conducts her research at the Neural Control of Movement Lab at ETH Zurich. Her work has already been breaking new grounds for research, offering hopeful perspectives for patients suffering from cerebral palsy.

Then, there is Stefano Battiston, Professor at the Department of Banking and Finance at the University of Zurich. He fully relies on EU projects when it comes to his areas of research: systemic risks within global financial systems, the effects of global warming on the economy as well as the involvements of the civic society in the policy process. Currently, he takes pride in his six ongoing projects within Horizon 2020's three priorities: Excellent Science, Industrial Leadership and Societal Challenges. Battiston is the coordinator of one of these projects. He tells us about the importance of grants in setting up one's own research group and how he leads the projects; lastly, he lets us in on the strategy he pursued when submitting one of his EU research projects.

An altogether different story is the one of Sven Koehler, CEO of the start-up Anerdy AG, who recounts how he was literally found by his first EU project in the areas of energy and green technology. He received a phone call and was asked to join the consortium, because his company was exactly the kind of technology provider still missing to ensure the success of the project. Today, Anerdy plays a key role in the entire undertaking and Koehler explains his initial experiences with the project and analyses the challenges and benefits of participation for an SME.

These three success stories are shared to emphasise the importance of the EU Framework Programmes for Research for Switzerland as a location for innovation. Especially for small and medium-sized companies, which provide the basis for the success of the Swiss national economy, these collaborative projects are highly significant, as they enable them to develop marketable products and services. As a result of the vote on the federal popular initiative against mass immigration, Switzerland is temporarily (until the end of 2016) merely partly associated with Horizon 2020. From a scientific perspective, it is crucial that a solution to this problem is found quickly, so that Swiss researchers – like their peers from EU countries – may fully benefit from all the opportunities Horizon 2020 has to offer.

We trust that you enjoy reading and are inspired by these European Science Stories.

Detlef Günther
Vice President Research
and Corporate Relations, ETH Zurich

Christoph Hock
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Cover: Visualisation of a complex financial network (team Stefano Battiston)

Taming the financial system

Complex systems science for a sustainable future

How Stefano Battiston and his team are contributing to a global financial system that serves society, channels funds towards a green economy and places citizens at the centre of policy process in finance.

Stefano Battiston is a rare phenomenon in the world of science. He started in physics, went into neuroscience for a while, returned to physics and complex systems, and eventually stepped into the field of social and economic topics, focusing on financial risks. "What motivated me was that during my studies I realised that whereas the physical reality and particularly the brain are not going to change in my lifetime, the economy is changing considerably.

> Nowadays the financial industry has a disproportionate influence on the policy process.

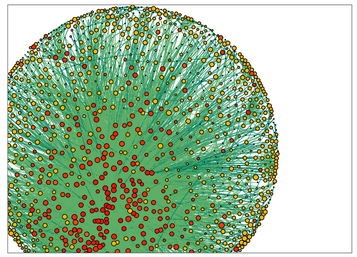
That was at the time of the dotcom crisis when we saw a number of changes in the way society was organized and business was conducted. It was exciting, so I decided to pursue that route," says Battiston to explain his unusual career path.

Such an interdisciplinary career is usually not rewarded in today's academia. Nevertheless Stefano Battiston has been highly successful, both as a scientist and as a project manager and fundraiser. Two years ago he was appointed Swiss National Science Foundation professor at the Department of Finance and Banking at the University of Zurich, where he now leads a team of eight researchers. He manages to finance his team mainly by funds from the European Union, participating in six Horizon 2020 projects from all three funding pillars (Excellent Science, Industrial Leadership and Societal Challenges) – a remarkable success.

Three fields of research on crucial topics

Stefano Battiston and his group focus on three research fields which cover the most fundamental future aspects of economic and policy issues. The first deals with systemic risks within the global financial system. The second covers environmental sustainability, mainly the impact of climate change on the economy. And the third concentrates on the participation of the civic population in the policy process. All three fields are highly connected. For instance, the costs of pollution such as CO_2 emissions are currently not included in the prices of products and services. But it is likely that this will change soon, which will lead to a revaluation of a huge number of assets and subsequently will have a major impact on the global financial system.

So on the one hand, Stefano Battiston and his research team study how the global financial system works, how financial institutions are interconnected, how contagion spreads through the system and how crises develop. Based on these findings, the researchers develop recommenda-



tions for improving the stability of the financial system and for channelling funds into a sustainable low-carbon economy. They look at how incentives or new financial instruments should be designed and regulations be adapted in order to foster the transition to a green economy. On the other hand, they deal with the very practical issue of how these findings could be implemented in politics.

It would be safer to have sectors that have a stronger identity – not everybody doing everything.

"Today we are more competent at reducing systemic risk by means of a number of counter-measures. We also know how to make the move to a lower carbon economy. Most of the technology is already in place. But we're still not able to move there politically. So now the question is: How can we improve the situation by bringing citizens back into the political process. We need to remove the obstacles that prevent us tackling both the systemic risk and the transition to a low-carbon economy," Stefano Battiston explains. And he adds, "Nowadays the financial industry has a disproportionate influence on the policy process with respect to other stakeholders. We want to improve the situation by getting society back into the driver's seat."

Making the financial system serve society better and making the economy greener, using scientific evidence - this is the goal of DOLFINS (Distributed Global Financial Systems for Society), the Horizon 2020 project Stefano Battiston is coordinating. And this is where complex systems sciences comes in.

Dealing with complex systems

Stefano Battiston's interest in complex systems science stems from his time as a physicist; he later applied this to understanding our financial system, a highly complex network linking players in a web of liabilities, expectations and interactions. Such systems are characterized by numerous feedbacks and loops, creating a huge and often unforeseeable dynamic. So it is difficult to predict precisely the behaviour of complex systems. But complexity scientists can analyse the interrelations of the players and the self-enforcing mechanisms, and from this they can draw up recommendations on how to minimize the risk of a crisis. Battiston mentions just one of the lessons drawn from analysing the complex financial system: "You certainly don't want to have a system that is fully and strongly interdependent – this is a recipe for disaster. So we would suggest more diverse business models. But today we are moving towards a global model in which each institution is doing almost the same thing: banks are also offering insurance, pension funds are lending, and everybody is involved in derivatives. But if everybody has the same type of portfolio, when there is a crisis everybody will be hit in the same way. It's safer to have sectors that have a stronger identity; insurance doing insurance, banks doing banking, pension funds doing pension funds."

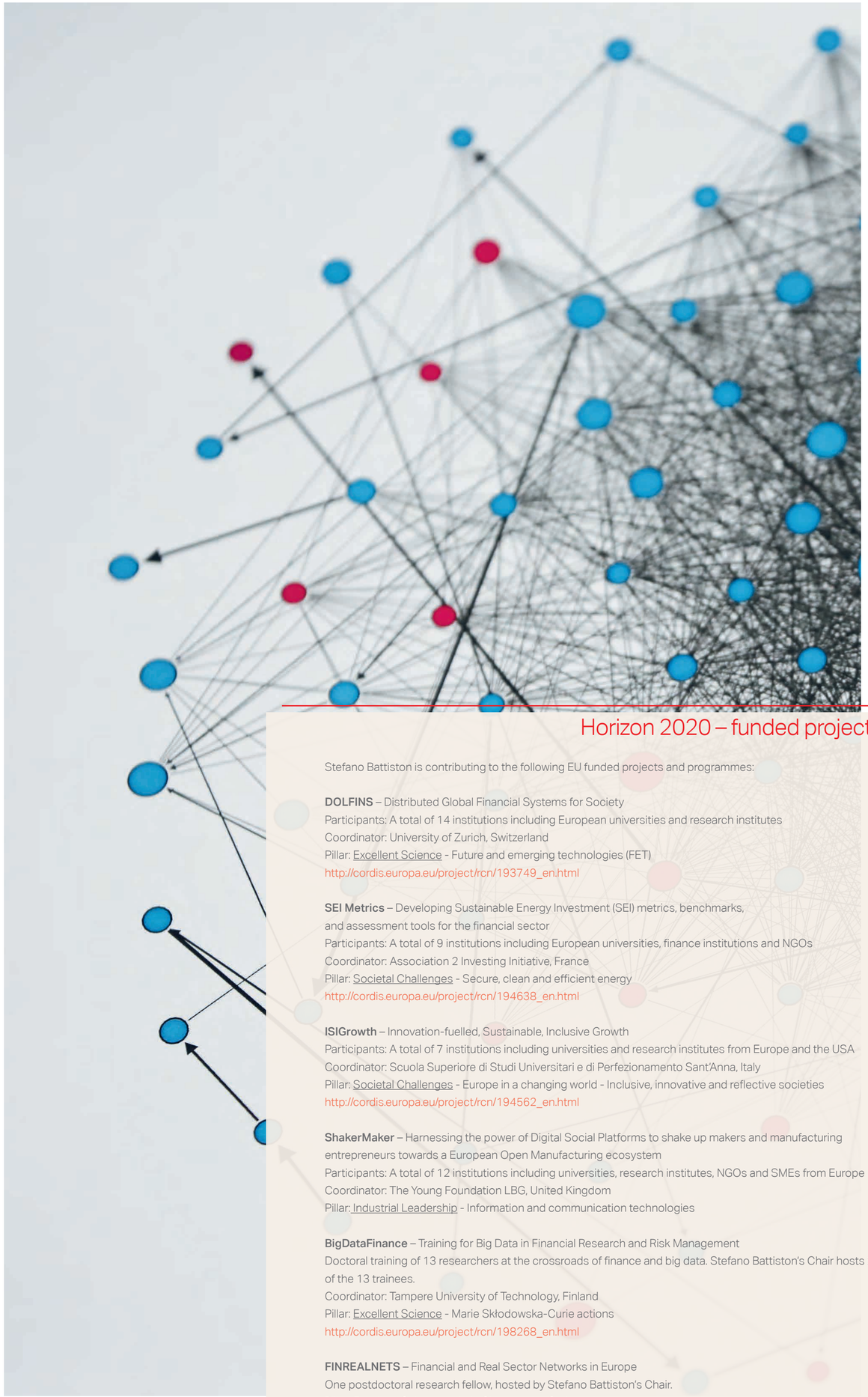
Complexity science methods of course play a key role in the DOLFINS project. But over and above that, Stefano Battiston sees DOLFINS as a junction where his three main research fields intersect and his interests in basic research and application meet.

You certainly don't want a system that is fully interdependent as this is a recipe for disaster.

By working both on the DOLFINS project and the other Horizon 2020 projects, Battiston is forming a well-matched, highly competent research network system, which will be instrumental in achieving the ambitious goals set by DOLFINS. So in every sense, Stefano Battiston is an expert and a master of complex network systems.

● Rolf Probala

Interview clip: www.grantsaccess.ethz.ch



Horizon 2020 – funded projects

Stefano Battiston is contributing to the following EU funded projects and programmes:

DOLFINS – Distributed Global Financial Systems for Society
Participants: A total of 14 institutions including European universities and research institutes
Coordinator: University of Zurich, Switzerland
Pillar: Excellent Science - Future and emerging technologies (FET)
http://cordis.europa.eu/project/rcn/193749_en.html

SEI Metrics – Developing Sustainable Energy Investment (SEI) metrics, benchmarks, and assessment tools for the financial sector
Participants: A total of 9 institutions including European universities, finance institutions and NGOs
Coordinator: Association 2 Investing Initiative, France
Pillar: Societal Challenges - Secure, clean and efficient energy
http://cordis.europa.eu/project/rcn/194638_en.html

ISIGrowth – Innovation-fuelled, Sustainable, Inclusive Growth
Participants: A total of 7 institutions including universities and research institutes from Europe and the USA
Coordinator: Scuola Superiore di Studi Universitari e di Perfezionamento Sant'Anna, Italy
Pillar: Societal Challenges - Europe in a changing world - Inclusive, innovative and reflective societies
http://cordis.europa.eu/project/rcn/194562_en.html

ShakerMaker – Harnessing the power of Digital Social Platforms to shake up makers and manufacturing entrepreneurs towards a European Open Manufacturing ecosystem
Participants: A total of 12 institutions including universities, research institutes, NGOs and SMEs from Europe
Coordinator: The Young Foundation LBG, United Kingdom
Pillar: Industrial Leadership - Information and communication technologies

BigDataFinance – Training for Big Data in Financial Research and Risk Management
Doctoral training of 13 researchers at the crossroads of finance and big data. Stefano Battiston's Chair hosts 2 of the 13 trainees.
Coordinator: Tampere University of Technology, Finland
Pillar: Excellent Science - Marie Skłodowska-Curie actions
http://cordis.europa.eu/project/rcn/198268_en.html

FINREALNETS – Financial and Real Sector Networks in Europe
One postdoctoral research fellow, hosted by Stefano Battiston's Chair.
Pillar: Excellent Science - Marie Skłodowska-Curie actions
http://cordis.europa.eu/project/rcn/203476_en.html

Pack your vision in a simple narrative!

How he managed to become a partner in six Horizon 2020 projects. - Five questions for Stefano Battiston, Professor of Banking at the University of Zurich.

Professor Battiston, you are currently benefiting from six Horizon 2020 projects and coordinating the ambitious DOLFINS project. This is a remarkable success. Do you follow a specific strategy regarding EU grants?

I realized very early that in order to build a group I had to rely on research grants. I've been applying for grants ever since I was a doctoral student in Paris. At that time my PhD programme was partly financed by a consulting company. But when the dotcom bubble led to an economic crisis, the first thing companies did was to cut research, which put my doctorate at risk. Luckily a few months earlier I had been involved in writing a proposal. Out of this proposal the first European project on complex networks emerged and was eventually granted. It saved both my PhD programme and my research career. So since then, writing proposals is a normal part of my activities, and during the course of time I have gained experience.

The strategy is first of all to have a clear vision of what you want to carry out and how to fit different things into one simple unifying framework. Then you have to develop good relations and strong scientific collaborations with colleagues who are also interested in research grants. I don't think you can plan the path in advance exactly. But in my experience, projects which have a clear vision, are well-written and well-thought through, are rewarded. So if you want to obtain research grants, this is where you need to invest your time and energy. The success rate is very low. So you have to understand that this is an investment which will only once in a while have a return. But that return is very high.

So what is your approach when you apply for EU grants and projects? Do you have a specific recipe?

I don't think there is a replicable recipe. But what's important is getting involved even in small tasks within a European project early on in academic life. In this way you come to understand what makes sense in a project – what is valued, what is not valued and how synergies and collaborations work between partners in a European project. This is very important and it's a long process. But once you have grown up in this kind of environment you're much more likely to be invited to an existing consortia and eventually at some point even be proposed as a coordinator. So I would say the recipe is first to get involved in one way or another, go to the information days linked to the calls and try to write proposals, for example. It's a learning curve which takes some time.

And how did you apply your experience to become partner of six Horizon 2020 projects?

Again, I would say the key is to come up with a strong vision. It has to be something really new, something that you strongly believe is an important scientific challenge with an impact for society. It has to be something you feel comfortable with and convinced of. That's the best recipe. Of course there's the technical aspect too, how to write the proposal in a way that complies with the regulations. But that's not enough. You have to pack your vision in a simple narrative. It should be something you are able to tell in simple terms in a few sentences.

And you need a good network as well?

The network of scientific collaboration has to favour excellence. So you need excellent collaborators who establish and maintain relations with partners across Europe. This is important. They also should be partners you can work with. Sometimes within the best universities and the best research groups there might be someone you are not able to get along with. So you have to pay attention to all three factors: excellence, cooperation and the ability of people to work with you as a team. Then you might be successful.

What are the benefits of EU grants and projects for you and your research?

We benefit from European grants in several ways. One is certainly that it forces you to take a more general perspective; it exposes you to what other people are working on and what they think. This is important in terms of research and societal impact. And it compels you to be even more interdisciplinary. That means talking to computer scientists as well as to economists and trying to be the bridge between them. We're combining different types of knowledge to produce something new. I think this is a fascinating process and the root of innovation.

Interview: Rolf Probala

Take off with Marie Skłodowska-Curie

Two views on an EU Excellent Science Programme

Why a young postdoc and an experienced professor jointly applied for a Marie Curie Fellowship, what they hoped to achieve and how they each benefited from the Horizon 2020 programme for young researchers. – An interview with Ellen Jaspers and Nicole Wenderoth.

Ellen Jaspers

Ellen Jaspers has a PhD in Biomedical Science from the Catholic University of Leuven, Belgium. Since January 2015 she has been a Marie Curie fellow in a postdoc position at the Neural Control of Movement lab of the Department of Health Sciences and Technology at ETH Zurich.

Ellen, why did you apply for a Marie Curie Fellowship?

I was motivated to apply because this scholarship offers young researchers a great opportunity to move on in their career. It allows you to go to a host lab and gain further expertise in your specific areas. I chose the Neural Control of Movement lab at ETH Zurich because of its excellence within the field of neuroscience.

So one day you decided to apply for a Marie Curie Fellowship?

When you do research there is always the question of searching for money or applying for grants to improve your CV and climb up the academic ladder. I think the Marie Curie Fellowship is a perfect stepping stone to enhance your CV. As I also really wanted to pursue a research career abroad, applying for a Marie Curie Fellowship was the perfectly logical next step.

The success rate is very low; how did you attain the Fellowship?

Writing the application was a challenge: you want to present innovative ideas and show that you are going to add value to the research that is already out there. The key was talking a lot with Nicole Wenderoth from the Neural Control of Movement lab about what's feasible, what might be interesting, what's already there, and what's still needed in the field of neuroscience. With my clinical background I could then also assess how the project would be clinically valuable. The combination of all these different angles and viewpoints definitely gave the project an added value, which was why it succeeded.

How did you find your host, the Neural Control of Movement lab led by Nicole Wenderoth?

Well, I met Nici during my PhD studies in Leuven. She then moved to Zurich to start up the Neural Control of Movement lab. After completing my PhD I was still left with the question of what defines upper limb functions: I saw many children with CP (cerebral palsy) and so much variability in their functioning which we couldn't explain just by measuring them clinically. So I wanted to investigate this and address the variability from a neuroscience point of view. I contacted Nici knowing she had an interest in doing further clinically applied research. We had a joint idea, one thing led to another, and that's how the project application was written.

What could Nicole Wenderoth and her team in Zurich offer you?

Nici has a lot of experience, for example in transcranial magnetic stimulation and in all the neuroimaging techniques I wanted to apply. For me it was crucial to learn these techniques, not only as a user but also from an analysis point of view. Nici and her team helped me a lot in gaining this specific expertise. The lab is a perfect base for setting up the project and gaining knowledge in the different neuroimaging techniques. And of course, Nici, with her keen, analytical mind helps me through. Every time we talk I walk away with new ideas and an ever greater motivation. That's really what keeps me going.

What is the main thing you gain from this Marie Curie Fellowship?

Without the Marie Curie grant I wouldn't be here and I wouldn't be doing this research. I wouldn't have the whole CP research line being set up now. I think it's a massive boost to get an opportunity that would otherwise not be there because of finance – you need money to do research. And now I've also got this really nice fellowship to put on my CV. If you think about the future, this is undoubtedly an added value.

What would you recommend to young researchers applying for a Marie Curie Fellowship?

Have a good CV to start with. And really find a project where you can show that it's the combination of you as a researcher and your host institute that takes it to the next level. As in my case, without Nici's lab I would not have been able to do this research; and Nici would also not have been able to set up this CP research line here without me. So I truly believe it's the combination of two people – the mentor from the host lab and the researcher – that creates an added value from which both benefit.

What are your plans for the future?

Well, first I want to finish my Marie Curie Fellowship, which ends in December of this year. And then I hope to be able to continue in this lab. The next logical step would be to apply for a professorship. Maybe not within ETH, but to go just one step further and set up my own research group. If I manage to set up the CP research line successfully it will offer the perfect base for starting my own research group, getting my own PhD students and taking my research to the next level.

And would you like to become a professor?

Being a professor would be a nice option, yes. But we also have to be realistic – it's still academia, it's still competitive. But in an ideal world, yes!

● Interview Rolf Probala

Marie Curie Fellowship SeMoRe-CP

SeMoRe-CP – Identifying structural and functional biomarkers of the brain indicating SensoriMotor Recovery in Cerebral Palsy

Host: ETH Zurich, Nicole Wenderoth, Fellow: Ellen Jaspers

FP7-PEOPLE-2013-IEF – Marie-Curie Action:
„Intra-European fellowships for career development"

http://cordis.europa.eu/project/rcn/187764_en.html

Nicole Wenderoth

Nicole Wenderoth has been professor at the Neural Control of Movement lab in the Department of Health Sciences and Technology at ETH Zurich since 2012. Her lab is the host institution for the Marie Curie Fellowship held by Ellen Jaspers; and Nicole Wenderoth is Ellen's mentor.

How did you and Ellen Jaspers come to agree on a Marie Curie Fellowship?

You know, all good things start in the kitchen. And it actually was in a kitchen where Ellen's Marie Curie Fellowship began. At that time I was thinking about how to build up my lab at ETH Zurich. I knew that Ellen had just finished her PhD and was looking for a postdoc position. Ellen was not only an academically trained physiotherapist, but also a physiotherapist with a PhD in biomedical science. So she understands both sides very well – fundamental research as well as clinical research. That was exactly the expertise I needed for my new lab in Zurich. So we met over a coffee and eventually I suggested that she came to ETH and start the lab with me.

And how did you get to know Ellen?

We knew each other from the Catholic University of Leuven. She was in a different department and I was actually part of her PhD committee. So I knew both her research work and Ellen as a person quite well.

So you both decided to apply for a Marie Curie Fellowship to bring Ellen to Zurich?

Well, I think the Marie Skłodowska-Curie Fellowships are fantastic funding instruments, both for us as professors and also for postdocs. When I looked at Ellen's CV, I thought she would be the perfect candidate for a Marie Curie Fellowship. Also the project she was working on could only be carried out within a bigger network. The difficulty with clinical research is that you need a large data set to prove that new interventions might work. It is very hard to do this research within a reasonable time in only one country. The European funding offered us a great chance because one of its aims is indeed to foster the cooperation of several partners across Europe. Ellen's project fitted into this pattern precisely, as cooperation with labs and clinics in Europe was a crucial element. Ellen now commutes between Switzerland, Belgium and the Netherlands, where we have clinical partners with a similar interest. We exchange patient data and new methods, and we communicate intensively with each other to push the project forward.

So you both sat down together and wrote this application?

Yes, as a professor you have a feeling for candidates who have an outstanding CV, and Ellen was one of them. But the deciding factor for me was that Ellen had already made a lot of impact with her work. Despite being quite a young researcher, the tool she developed during her PhD has already been implemented by other groups across Europe. If you do research in a clinical setting that is exactly what you want to happen.

In writing the application we demonstrated her expertise, our own expertise in the lab, and especially how they complement each other and what synergy this would produce. Another aspect we focused on was developing Ellen as a fellow. Our postdocs are not just here to be independent researchers. We also want to offer them further training and the opportunity to build up their own career, so they can stay in academia. They are the best talents we have, and it would be a great pity if they dropped out. So I believe we should do whatever we can do to promote and keep our talent.

And what do you expect from this fellowship?

It offers us an excellent opportunity to translate knowledge all the way from particularly high-tech fundamental research to methods that we think might - in the long run - be useful for improving therapy planning. For me this is the really exciting perspective. But let's be absolutely clear: this project is only happening because Ellen is here.

In which way do you and your lab benefit from Ellen and her fellowship?

Firstly, Ellen brought expertise to our lab that would have been difficult to find otherwise. As I said, Ellen is a physiotherapist with a PhD. You don't find many of these experts in Europe and you hardly find any in Switzerland or Germany. Secondly, running clinical studies is an art and working with children is particularly demanding. Ellen had experience in performing this type of clinical research. So we've started a new line of research and built up a new network of collaborators and connections. From there we want to strengthen and continue this research line even once Ellen has left our lab.

Would you encourage professors to host a Marie Skłodowska-Curie fellow?

Yes, I would definitely recommend they do so. Of course, the prerequisite is finding an excellent postdoc as a fellow. But if you find this person and if you can develop a project together with your fellow, you bring top-quality scientific expertise as well as cultural diversity to your lab. And this benefits everybody: you, your team, and the fellow.

But don't some professors think all the form-filling takes too much energy and time?

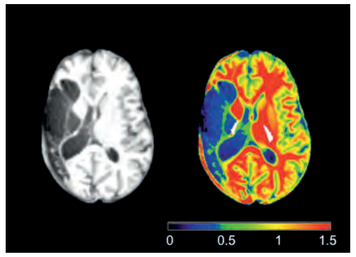
Here in Zurich we have the EU GrantsAccess Office and they help a lot with administration, both when applying for a grant and also later on. For Ellen, the administration and the financing part of the application was handled entirely by the EU GrantsAccess Office. They made it extremely easy for us to apply.

Ellen's fellowship will end this year. Are you already looking for another Marie Skłodowska-Curie fellow?

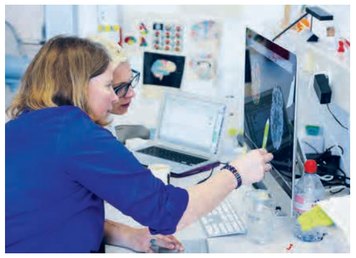
I'll take Marie Skłodowska-Curie fellows any time. As soon as I spot a talent on the market, I'll definitely try again!

● Interview Rolf Probala

Interview clip: www.grantsaccess.ethz.ch



Performing a series of tests on children and adolescents with CP



New hope for cerebral palsy patients

Cerebral palsy (CP), caused by a lesion of the developing infant brain is the most common cause of childhood physical disability. Children with CP experience lifelong impairments of motor and sensory functions that restrict their independence in daily life and put a high emotional and financial burden on families, caretakers and society. An early well targeted rehabilitation therapy could help to minimize long-term disability and maximize the child's daily functioning. However, the development of such therapies firstly requires clear and simple diagnostic measurement methods. Therefore the overall goal of Ellen Jasper's project is to identify neural biomarkers that are linked to sensorimotor dysfunction of a child. Based on these findings, she then intends to develop a series of simple tests for clinic use such as the young CP patients can be categorized and get a tailor made treatment. To identify the associations between neural biomarkers and arm and hand dysfunctions, Ellen Jaspers performs several tests in children and adolescents with CP in Belgium and in Switzerland. These tests include transcranial magnetic stimulation to see which side of the brain controls which hand, screening technics like MRI to look at the anatomy and the structural connectivity of the brain but also behavioral measurements. At the moment Ellen Jaspers expects to define about five different categories, which then could be identified with a few simple tests in the daily routine of a clinic. This is still a future vision and Ellen still has a long way to go. But with her research enabled by the Marie Curie Fellowship and the support of Nicole Wenderoth, Ellen Jaspers has paved the way for a new research line which is not only scientifically challenging but also opens promising perspectives for young CP patients.

● Rolf Probala

EU GrantsAccess' Marie Skłodowska-Curie Actions Group

The Marie Skłodowska-Curie Actions (MSCA) Group at EU GrantsAccess aims to keep on top of the often changing regulations of the MSCA in order to ensure high-quality advice at ETH Zurich and at the University of Zurich. The group meets regularly to discuss new calls or changes and is in contact with the relevant sections at ETH Zurich and the University of Zurich, such as the finance departments and Human Resources. This means that young MSCA researchers enjoy a smooth- running fellowship and can focus on their project. A big asset of the MSCA group is their close collaboration with the National Contact Points for MSCA at the Euresearch Head Office in Berne. Here, Sibylla Martinelli and Juliane Sauer keep abreast of the newest developments and results through ongoing contact with the executive agencies in Brussels and their peers in Europe.

Members of the
Marie Skłodowska-Curie Actions Group:
Frédérique Amor, Annika Glauner,
André Wunder, Alexandra Zingg

A phone call with consequences

Wind energy for Europe's buildings

How the Swiss start-up company Anerdgy became a partner in the prestigious Horizon 2020 project ZERO PLUS and how it contributes to shaping the designs of a new generation of net zero energy settlements.

One spring day in 2015 Sven Koehler, CEO of Anerdgy AG received a call on his mobile phone. "Hello Mr. Koehler", said the voice on the line. "We found your technology on the internet. There is this Horizon 2020 ZERO PLUS project. Would you like to join us?" The man on the line was Thomas Bock, professor at the Chair of Building Realisation and Robotics at Technical University of Munich, one of the leading partners involved in ZERO PLUS.

> I was attracted by their WindRail system, a very innovative, advanced technology.

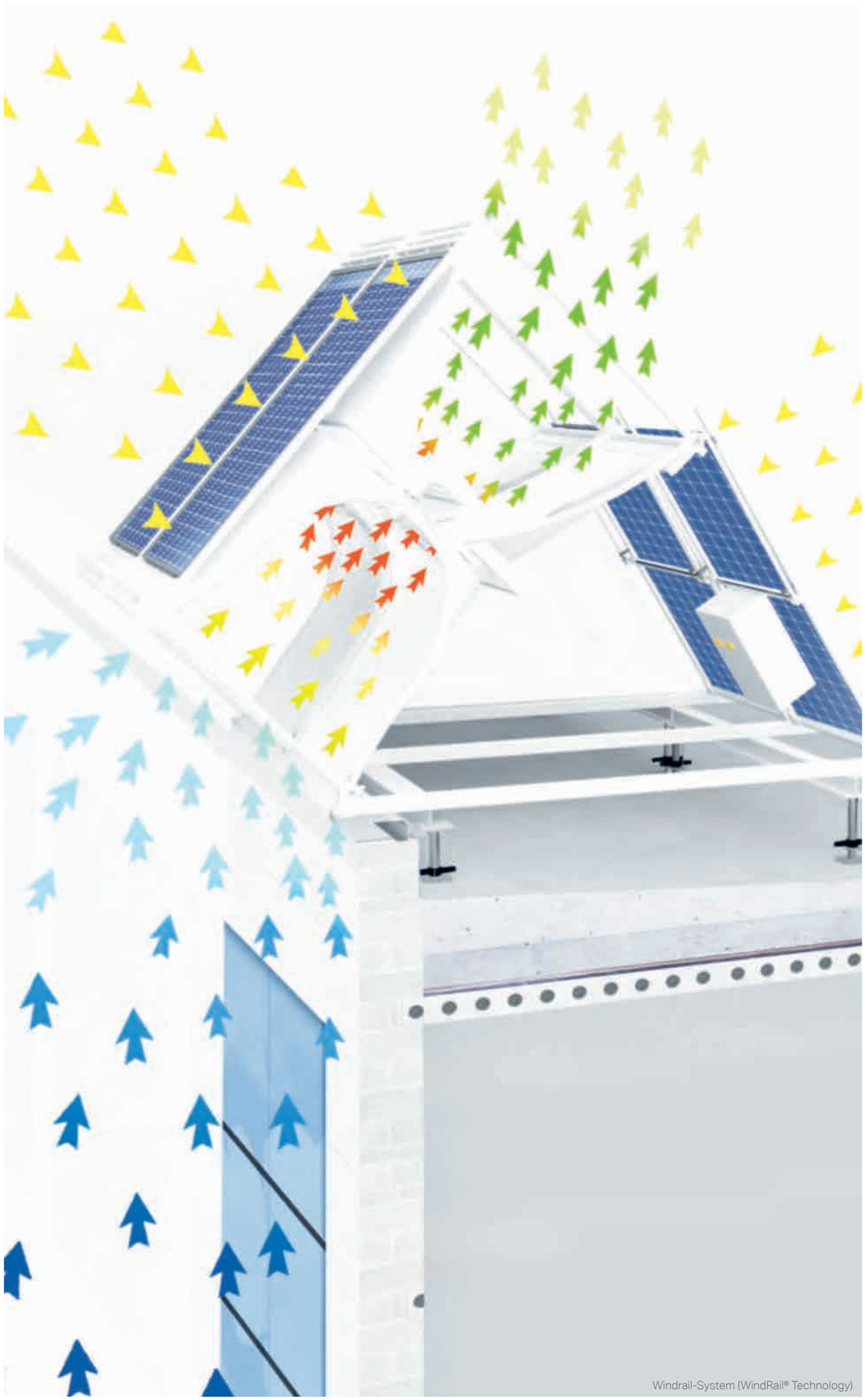
A year later, in spring 2016, Sven Koehler is sitting alongside 25 academics, engineers, technology providers and building owners at the large table in the meeting room of the ABB convention centre near Bergamo, Italy. The ZERO PLUS consortium has come together for its first progress meeting, hosted by ABB Italy, one of the 15 partners participating in the project.

Six months have passed since the kick-off meeting in October 2015 in Cyprus. Now the heads of 10 "work packages" are to present their results. The bulk of the work during the past months has been basic research – collecting and linking data on standards, energy saving and production technologies, systems design, management and costs, as well as microclimate data of the places where the four case study settlements are to be built. A huge number of results and conclusions are presented and discussed in the course of the afternoon. But they are still on a rather academic level. The challenge for the consortium is to use this data for developing smart combinations of existing and new technologies and in concepts for managing buildings efficiently. Through four case study settlements the ZERO PLUS consortium has to prove that the project objectives can be achieved in the real world of settlement constructions.

In the next phase of the project, technology providers therefore play a crucial role. Based on the data and specifications of their colleagues from academia, they have to develop highly efficient, smart sets of technologies and concepts to build settlements which both produce even more energy than they consume and can be constructed at a much lower cost than today.

Small but crucial

This is where Sven Koehler comes in. His start-up Anerdgy is the smallest of the four technology providers taking part in the project, but is expected to play a key role. "Anerdgy was recommended by Shabtai Isaac from the Ben Gurion University of the Negev, when we were looking for a technology provider that can produce clean energy at



Windrail-System (WindRail® Technology)

the community level", explains Matt Santamouris, professor of physics at the National and Kapodistrian University of Athens, and coordinator of the ZERO PLUS project. So why did Shabtai Isaac recommend Anerdgy? The professor of structural engineering answers with a smile: "Our partner at TU Munich found Anerdgy on the internet and asked me to screen it, before they would definitely invite Sven Koehler to join in.

> This is quite a challenge for a small start-up like Anerdgy, technically and financially

I was very attracted by his WindRail system – a very innovative, advanced technology, but not yet on the market. I contacted Sven Koehler on Skype and was very impressed by his scientific expertise, his commitment and his understanding of management. He fitted perfectly into the project." So that was how the small Swiss start-up Anerdgy was invited to join the prestigious Horizon 2020 ZERO PLUS project in spring 2016. But what has Anerdgy to offer? Koehler names two fields where it can make a substantial contribution: "On the one hand there is our WindRail technology, which we can bring into the case study settlements. On the other hand there is our knowledge in designing building technologies and in adapting our system to existing building technologies and products. In both these fields we have considerable experience and competence."

Challenges for a small start-up

After the first day of the meeting Sven Koehler feels uneasy. The time schedule is very tight. The plans of the four case study settlements should be completed by the end of 2017 in order to start construction in 2018. But the exact shape of the houses, the technologies to be used and the integration of the WindRail system are not yet sufficiently defined. So on the second day of the meeting Sven Koehler decides to concentrate on talks with the case study owners and the technology providers. "This morning I will see Paolo Perani from ABB to align the electronics between WindRail and ABB. They are providing the inverter, we are providing the generator to produce electricity from wind and sun; and this has to be matched. And next I will meet Seongki Lee from TU Munich. He is responsible for the prefabricated façade design in which the house technology including our WindRail technology will be integrated", explains Sven Koehler as we drive from the hotel to the ABB convention centre.

Later in the day he meets the owners of the case study settlements from England, Cyprus, France and Italy one by one, in order to clarify the status of their building projects.

> Our challenge is to provide an optimum product that fits the needs of all four case study settlements.

Some have changed shape in the meantime and have turned from large buildings with flat roofs to family houses with saddle roofs. This represents a fundamental change for Anerdgy, as its WindRail technology is basically designed for large flat-roofed buildings. So Sven Koehler and

Anerdgy AG

is a Swiss start-up company in the energy and green-tech sector. It aims to bring renewable energy production close to the point of consumption by harvesting wind and solar energy on the roof edges of buildings. The company, based in Zurich, was founded in 2012 by Sven Koehler and became operational in 2013. Currently the Anerdgy team consists of seven employees.

Sven Koehler

graduated in Systems Engineering from the Erfurt University of Applied Sciences and obtained an MBA in General Management at the University of St. Gallen. From 2003 to 2013 he held several positions at Alstom Power and the Alstom Group in Switzerland and abroad. Since 2013 Sven Koehler has been CEO of Anerdgy.

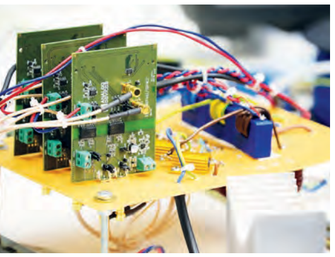
WindRail®

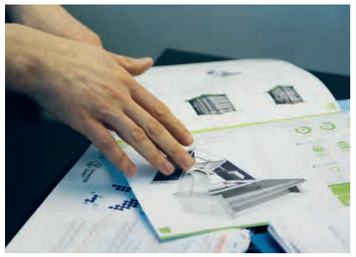
is an innovative electricity generating system which is sited on the roof edges of residential, commercial and industrial buildings. It exploits three natural energy sources: solar radiation, wind, and pressure differences. The horizontal pinwheel powers the generator which produces electricity. The solar panels on the top of the module also generate electricity. In addition, the WindRail module can serve as a carrier for several building technologies such as lightning protection or rails for façade cleaning lifts.

The WindRail technology was invented by Sven Koehler and developed by his Anerdgy team. At the moment Anerdgy offers two types of modules: WindRail C40 for large industrial buildings, and WindRail C30 for smaller commercial and residential houses. WindRail is expected to cover 20% to 50% of the electricity consumption of a large building. In May 2016 the first pilot project of a residential settlement using WindRail technology is being inaugurated in Berlin.

http://www.anerdgy.com/

Paolo Perani from ABB (right) explains the systems for Net Zero Energy (NZE) settlements to Philippe Moseley, project officer at the Executive Agency for Small and Medium-sized Enterprises (EASME) of the European Commission (middle).





his team must now develop adapted WindRail versions. This is quite a challenge, technically and financially, for a small start-up like Anerdgy. "Definitely not an easy task," Koehler admits. "Our challenge is to provide an optimum product that fits the needs of all four case study settlements."

So, when the ZERO PLUS progress meetings end after three days, Sven Koehler takes home a bundle of problems to solve. "We now have to focus on some R&D aspects to provide the project with the right tools, on time," he says on his way back from Bergamo to Zurich. 'On time' means that the tools should be feasible within six months, for the next progress meeting in autumn. Nevertheless, Sven Koehler is confident of being able to meet these challenges.

We benefit from having pilot projects all over Europe.

And his start-up Anerdgy is already benefiting from participation in the Horizon 2020 ZERO PLUS project: "First of all we profit from having pilot projects all around Europe – this brings our knowledge to all the partners, and we also benefit from their knowledge. Furthermore we gain a deep understanding of the needs and behaviour of the stakeholders in such a complex project. And lastly, as this project is highly visible and well-communicated, it generates a strong marketing impact. It will demonstrate that our product is feasible for the whole European market," concludes Koehler. So for Sven Koehler and his start-up Anerdgy, that phone call from Munich in spring 2015 was quite a lucky punch.

● Rolf Probala

Interview clip: www.grantsaccess.ethz.ch

HORIZON 2020 - ZERO-PLUS

stands for one of the most ambitious R&D projects the EU commission has launched within the Horizon 2020 programme. The project's full official name "Achieving Near Zero and Positive Energy Settlements in Europe using Advanced Energy Technology" indicates its challenging objectives. By 2018 an international consortium of academics, technology providers and case study owners are to develop comprehensive, cost-effective systems for Net Zero Energy (NZE) settlements and implement them in four case studies across Europe. ZERO PLUS buildings have to meet three clearly defined specifications: a) to reduce the operational energy usage in residential buildings to an average 20kWh per m^2 per year, b) to produce at least 50 kWh/m^2 renewable energy per year, and c) to reduce the construction costs of zero plus settlements by at least 16% compared to current zero plus building costs.

To achieve these objectives, the consortium focuses on a series of strategies. Energy consumption will be reduced by a number of existing technologies such as efficient insulation, heating and lighting, as well as automated building energy management. To produce renewable energy, advanced photovoltaic systems and the innovative WindRail technology developed by the Swiss start-up Anerdgy will be integrated into the buildings. Further improvements will be effected by efficient management of loads and resources at a settlement instead of at a single house level. But the key point will be combining the various technologies and management tools into smart modules that can be customized and optimized to meet the specific requirements of each building, and implemented by cost-effective industrial processes. The schedule is as challenging as the objectives: by 2018 the four case study settlements should be up and running and prove the concepts are working. The results will then be monitored and disseminated for a market uptake.

The ZERO PLUS consortium

consists of 7 universities and research institutes from Greece, Cyprus, Germany, Israel, Italy, and UK, 4 technology providers (among them ABB Italy and Anerdgy Switzerland) as well as 4 real estate companies from Cyprus, France, Italy and UK as case study providers. ZERO PLUS started in October 2015 and will end in October 2019. The project has an overall budget of 4.2 million euros and is coordinated by Matt Santamouris from the National and Kapodistrian University of Athens (UOA).

http://zeroplus.org/index.php/fr/

EU GrantsAccess – Swiss Participation in Horizon 2020

This second volume of the European Science Stories introduces you three successful projects within Horizon 2020. The stories illustrate vividly that project participation is possible in all areas and with very different backgrounds.

Here is a summary of the structure and the three pillars of Horizon 2020:

HORIZON 2020
(2014 – 2020)

EXCELLENT SCIENCE

- European Research Council
- Future and Emerging Technologies
- Marie Skłodowska-Curie actions
- Research Infrastructures, including e-infrastructure

INDUSTRIAL LEADERSHIP

- Leadership in Enabling and Industrial Technologies (LEIT)
  - Nanotechnologies, Advanced Materials, Advanced Manufacturing and Processing, and Biotechnology
  - Information and Communication Technologies
  - Space
- Access to risk finance
- Innovation in SMEs

SOCIETAL CHALLENGES

- Health, Demographic Change and Wellbeing
- Food Security, Sustainable Agriculture and Forestry, Marine, Maritime and Inland Water Research and the Bioeconomy
- Secure, Clean and Efficient Energy
- Smart, Green and Integrated Transport
- Climate Action, Environment, Resource Efficiency and Raw Materials
- Europe in a changing world - Inclusive, innovative and reflective societies
- Secure societies – Protecting freedom and security of Europe and its citizens

Spreading Excellence and Widening Participation

Science with and for Society

Cross-cutting activities (focus areas)

Fast Track to Innovation Pilot

European Institute of Innovation and Technology (EIT)

Euratom

Smart Cyber-Physical Systems

http://ec.europa.eu/programmes/horizon2020/h2020-sections

Sofia Karakostas (l.) and Agatha Keller, Co-Heads EU GrantsAccess

When it comes to participation and funding regulations, special conditions apply for Swiss partners, depending on the individual call.

EU GrantsAccess is always up to date regarding the latest information concerning Switzerland's status within Horizon 2020. We therefore encourage you to contact us if you are planning to submit a proposal or were contacted to become a partner within a consortium.

EU GrantsAccess will gladly support and guide you through the application process.

Contact: www.grantsaccess.ethz.ch

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Publisher	**EU GrantsAccess**
Editors	**Sofia Karakostas** **Alexandra Zingg** **Rolf Probala**
English Proofreading	**Clare Bourne** **Franziska Brunner**
Photos	**Andreas Talanow**
Design	**speckdrum** **www.speckdrum.ch**