



Skolkovo, Russia

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NEWSLETTER  
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# Skoltech

## Skolkovo Institute of Science and Technology



Edward Crawley  
President of Skoltech

Greetings from Skoltech!

The new year has begun and we continue to pick up pace at Skoltech.

Our students have already returned to classes following their winter break. They impressed an audience comprising Skoltech leadership and Skolkovo Foundation President Victor Vekselberg with presentations over the lessons they had learned while abroad.

We are continuing to develop our factory for innovation by concentrating efforts on the search for CREI directors and selecting 20 semifinalist proposing teams in the Second Round Call for Proposals.

We have also been active integrating the needs of industry with our research priorities, signing research agreements with four Russian energy companies and holding conferences with leaders from industry on composite materials and upstream oil.

We are looking forward to the March student Selection Weekends at Skoltech as more promising students join us in accelerating innovation.

Edward Crawley  
President of Skoltech

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## Students@Skoltech

### Skoltech's Students Present Their First Semester Experiences

For more information about Skoltech students and admissions, please contact Bram Caplan, Director of Student Affairs at [caplan@skolkovotech.ru](mailto:caplan@skolkovotech.ru) or visit the student admissions website <http://skoltech.ru/admissions>

On January 10, Skoltech's inaugural class met with Skolkovo Foundation President Victor Vekselberg and Skoltech leadership, presented the projects they had worked on in their first semester, and engaged with him on how to further develop the projects.

During their winter holiday, Skoltech's first class of 20 students took the opportunity to demonstrate the lessons they'd learned from their first semester in analyzing problems and transferring ideas into commercial results.

The students are pioneering a pilot 3-year Master's degree program in Information Science and Technology and Energy Science and Technology, including a year abroad at MIT, Imperial College London, ETH Zurich, and Hong Kong University of Science and Technology.

The students presented a wide range of projects such as SmartStop, a touch screen service for bus stops to display advertisements, bus schedules, and interactive maps. Another project TapDeck, which uses NFC technology, won the Boston TAPPED Hackathon for its ability to instantly send a presenter's slides to audience members by simply tapping their phones to an NFC tag. A technology called Sunbeam, shields the presenter's eyes from a projector's beam of light. Another presentation for the application Easy Wallet demonstrated the ability to save time while budgeting one's expenses. The final project called SkyPaper portrayed a program that uses Skype video to follow an individual's hand as they draw or write, transcribing the image from a paper to digital space.



Victor Vekselberg shares his advice with Skoltech's students during a meeting January 10.



Vahe Taamazyan presenting the project TapDeck which won the 2012 Boston Tapped Hackathon.

The students spending a year at Imperial College London had dedicated a large portion of their time within a research lab and chose to focus on their work in thin films technology and nanofabrication. Within this laboratory, they have been working with a group to develop a material to transform infrared light into electricity. Another group discussed their experience in the MIT course 2.009 Product Engineering Processes, which focuses on training engineers to construct solutions to real-world problems.

Victor Vekselberg, summarizing his hopes for the students, said, "We only want one thing: that you all personally participate in the creation of this university in Skolkovo, that each one of you are ambassadors of our philosophy and approach to science and education. You will need patience to make it along the difficult path to success and prove that you can achieve it. For your success is also the success of Skolkovo."

## Research@Skoltech

### Skoltech Seeks to Found Five More Centers of Research, Education and Innovation

Skoltech has selected 20 out of 143 preliminary proposals to advance to the final stage in a contest forming Centers for Research, Education and Innovation (CREIs).

Over 100 international expert peer reviewers and Skoltech's Steering Committee evaluated the 143 preliminary proposals. After much deliberation, they selected 20 proposals, which included five Nobel Laureates within the applying teams. These research teams hail from 32 partnering universities in six different countries.

The next step for these research teams is to develop full proposals of their research concepts to receive funding for five years and establish their research projects at Skoltech.

The applicants will continue on through a stringent review process, sending in full proposals by March 29, resulting in a second round of evaluations, and final presentations before an international panel of reviewers, Skoltech's Steering Committee and senior staff on April 19. The Skoltech Steering Committee will then propose finalists to its Board of Trustees with invitations to negotiate the establishment of a CREI expected to be announced after May 13, 2013.

CREIs couple research with education and innovation as key components in building capacity at the university. Specifically, they assist Skoltech in developing world-class research teams, instruments, and facilities. The CREIs also focus efforts on addressing critical problems facing industry and society, particularly in a Russian context.

By 2018, the university plans to establish at least 15 CREIs. Resulting from a first call for proposals, three centers have already been selected and announced. In this second Call for Proposals, Skoltech expects to choose 5 more.

## Selected Semifinalists by Research Area:

Biomedicine (5)  
IT (4)  
Space (4)  
Energy (3)  
Nuclear (2)  
Cross-cutting (2)

## Countries Represented In the Pool of Semifinalists:

Germany  
Israel  
Netherlands  
Russia  
UK  
USA

For more information about Skoltech's CREI Program, please contact Ivan Sherstov, Director of Research, at [sherstov@skolkovotech.ru](mailto:sherstov@skolkovotech.ru). Further information can be found at the Skoltech website: <http://skoltech.ru/research>

## Leadership@Skoltech

### What inspired you to join Skoltech?

I truly enjoy bringing people together, building international alliances, building new programs, colleges and universities from the ground-up using non-traditional structures that promote multidisciplinary research and educational frameworks without confining borders. I have been involved in such efforts in the Middle East, Kazakhstan, Singapore and the US. Moreover, my responsibilities over the last 10 years have included building international joint-degree programs (e.g., between Singapore and the University of Illinois at Urbana-Champaign in the USA, the Karolinska Institute in Sweden, and the Indian Institutes of Technology in India). Added to these is my long involvement in developing and running a large research program through the Singapore-MIT Alliance. Skoltech combines such elements, including collaboration with MIT. So it is a perfect opportunity for me to continue to do what I enjoy – in a new setting – in the rich intellectual and cultural tradition Russia represents.

### What did you learn from your previous experiences that will help Skoltech?

The previous experience taught me a number of things, ranging from rethinking what a university should be or can be if one starts with a clean slate, how to bring the best of successful, established practices and combine them with novel ideas to create new edifices, and how to do these in new cultural settings. Even at the simplest level, such exercises pave the way for new perspectives and an “altered state of mind”. For example, imagine what one can do in machine-learning or artificial intelligence by bringing together, say, a specialist in complexity theory and nonlinear dynamics and a neuroscientist! Imagine how the design of physical space can influence the way people interact. How do you design a campus so researchers with no apparent links between their work can come into contact and connect? These are rich and challenging opportunities we are giving careful thought to at Skoltech.

### Can you give an example of the benefits of post-disciplinary thinking?

New breakthroughs in science and technology often occur when two or more apparently unconnected ideas or concepts from different “traditional” disciplines merge to reveal previously unknown connections. One of my projects at NUS was with a biochemist interested in coaxing biological cells to produce pharmaceuticals and an electrical engineer and nanotechnologist working on the fabrication of surfaces with intricate nanostructures for electronics or other non-biological applications. At one time, we were traveling together to Vietnam and casually discussing our activities and “how different they were”. As we continued our in-flight discussions on the ground, we realized that we could probably combine our interests and use specially created nanostructured surfaces to induce the cells to produce certain biochemicals efficiently and that we could enhance this possibility by integrating such substrates with microfluidics technology to create “nanofactories” that can benefit from precise spatial and temporal control of multiple stimuli (e.g., hydrodynamic, electrical).

I know very little biology, my biochemist friend barely understands physics or mathematics, and neither of us know anything about nanofabrication. We come from different “cultures” and speak different “languages”, but we realized that we complemented each other wonderfully. I can cite many such examples from my experience alone, but this experience of mine is not unique. New breakthroughs require a melting pot that brings disparate expertise, experiences and mindsets together. That is our vision of Skoltech, a “knowledge factory”.

### Skoltech plans to hire 200 faculty members by the end of the decade, how will you achieve this daunting task?

The key is recruiting a critical mass of senior faculty members with a strong inclination for mentoring and developing their junior colleagues unselfishly. They also should be strong educators and researchers with international standing who can attract younger talent.

We can then recruit young faculty members and provide them with a nurturing environment that allows them to grow, to be independent. We can offer opportunities that they might not have in a rigid, traditional environment.

I can give you two examples from my personal experience. One example is the University of Houston Chemical Engineering Department in the 1980’s, which attracted some extremely good senior people by challenging them to come there and create an environment for growth. We then recruited and developed excellent young faculty members, and the professional community started to take a second look at our

Department (in a university that was not in the top-tier in the US). They saw what we were doing and recognized our vision, boldness, accomplishments and promise. Soon the Department rose to number 7 in ranking (ahead of MIT) in the US by the National Research Council survey of graduate programs.

The second example is the Department I headed and restructured at NUS during my first 5 years there. It was basically a good Department with a lot of hard-working people. But they were weighed down by an archaic academic structure and a lack of role models and international visibility. I brought seasoned academic leaders to the Department, some for a few months per year and others for shorter visits or sabbatical stays. The visitors became mentors for the new faculty. This did wonders. In five years, the Department climbed to a top-10 spot internationally in the rating done by the Higher Education Supplement of the Times of London, and it still remains there.

### Who is your ideal research center director candidate?

My model is a person with three key qualities: (i) **People who take calculated risks** – people who are wired to build things and who define themselves in terms of their drive to be pioneers and risk-takers. These are individuals who have a “start-up mindset”. An average person may not want to join a university at its formative stage, as getting set up and building one’s programs can be frustrating at times. So we need people who thrive in such challenges and see them as their source of energy. We need “cathedral builders”, not “brick layers”.

(ii) **Nurturers/enhancers** – people who view one of their primary goals as one of nurturing, mentoring and developing others; people who empower and enhance those around them.

(iii) **People who are secure in themselves** – people not intimidated by having to hire colleagues who are better than they are. In fact, this is a mark of a true leader.

At the Director or senior-faculty levels, we want people who have a larger vision, a sense of mission and a passion to build teams. We need people who are selfless and giving. We want people who define their success in terms of the success of the people around them and who work with them. Some of the most successful leaders are those who hire people who are better than themselves. Successful leaders know how to listen and enjoy the company of contrarians. We need people who come from this breed as Center Directors.



**Raj Rajagopalan**  
Dean of Faculty

#### Education:

PhD, Syracuse University, New York

MSc, Syracuse University, New York

BTech, Indian Institute of Technology, Madras, India

Engineering, NUS

#### Professional Experience:

Director, Middle East Affairs, National University of Singapore

Director, NUS-KAUST Special Partnership

Program Chair, Chemical & Pharmaceutical Engineering, Singapore-MIT Alliance

Deputy Executive Director, NUS Graduate School for Integrative Sciences and Engineering

Professor, University of Florida, Department of Chemical Engineering



Raj Rajagopalan and Professor Julia Stoyanovich speaking together at a Skoltech research conference.

For more information on the Faculty Search, please contact Raj Rajagopalan, Dean of the Faculty, at [raj@skolkovotech.ru](mailto:raj@skolkovotech.ru)

## Innovation@Skoltech

Ilia Dubinsky, Director of Skoltech's Center for Entrepreneurship and Innovation, Discusses Teaching Innovation at the Gaidar Forum

For further details about activities by the Center for Entrepreneurship and Innovation (CEI), please contact Ilia Dubinsky, Director of CEI, at [dubinsky@skolkovotech.ru](mailto:dubinsky@skolkovotech.ru)

On Friday, January 18, experts on innovation, R&D, and education gathered at the Gaidar Forum to discuss a wide variety of issues relating to the Russian educational system and its role in creating an innovative society.

The speakers, including Ilia Dubinsky, focused on the role universities play in generating innovation and raising demand for it. They also touched upon the steps necessary for Russian universities to adapt to the changing economic context, the growing demand for talented researchers, innovators, entrepreneurs and managers, and expectations by their future employers in industry.

In his speech Ilia focused on the key features of an Innovative University, stating,

“In the Innovative University education is complemented by research with consideration of use and integrated with curricular and extracurricular programs that teach

innovation and entrepreneurship skills, foster knowledge transfer to society, and facilitate close exchange with the relevant communities outside the university. Students of such a university learn how to find solutions to open-ended challenges. All the university's activities aim to result in positive economic impact and social benefit.”

Ilia also analyzed some successful examples of teaching innovation from around the world drawing the conclusion that currently no institution in the world approaches teaching innovation systematically, covering all necessary components “by design”.

“Skoltech can be considered a laboratory of university innovation”, he added.



Ilia Dubinsky, Director of Skoltech's Center for Entrepreneurship and Innovation, Discusses Teaching Innovation at the Gaidar Forum on January 24, 2013.

## Industry@Skoltech



Skoltech signs cooperation agreements with leading energy companies. From Left to right: CEO En+ Group Artem Volynets, Deputy Chairman Fedor Opadchy of System Operator of the United Power System, Skoltech President Edward Crawley, Operating Director of IDGC Holding Andrey Murov, and Igor Kozhukhovsky, General Director of the Energy Forecasting Agency.

Skoltech Begins Collaborating With Leading Russian Energy Companies to Model Complex Electrical Systems

The Skoltech moved forward on joint research after signing bilateral agreements with four leading Russian corporations: IDGC Holding, Energy Forecasting Agency, System Operator of the United Power System, and En+Group.

The agreements will permit Skoltech and its industrial partners to conduct joint research into modeling complex electrical systems and collaboratively design education programs. These companies will also co-finance a research center at Skoltech that specifically focuses on technologies to improve their competitiveness.

“Our goal is to create an international research center — Center for Research, Education, and Innovation — which is centered around the electrical industry,” said Skoltech President Edward Crawley. “This is an unusual approach, usually scientists look at pieces of science instead of systems such as the electrical distribution system. We will combine this systems view with the development of individual technologies in such a way that these technologies will more rapidly impact and have influence on this system.”

Skoltech and En+Group will focus on developing smart grid systems and modeling complex social and technical electrical systems. They will also concentrate their efforts in cross-cutting fields to

produce alternative and renewable sources of energy and new materials as well as creating technologies for generating electricity, superconductivity, and reducing energy losses for heating systems.

In joint research between IDGC Holding and Skoltech, the two will target designing technologies for automatically measuring energy use, managing and monitoring energy demand, and telecommunications. They will also strive to produce new methods for running diagnostics on equipment and new materials for electric power lines—promoting energy effectiveness and presenting more ecologically safe alternatives.

Skoltech and System Operator of the United Power System will jointly develop and implement methods for modeling, creating algorithms, and analyzing and managing electricity grids. The collaborative center will be tasked with adapting the world's leading algorithms and analytical models for Russia's specific context and electric power systems.



For more information on Industrial Cooperation, please contact [industry@skolkovotech.ru](mailto:industry@skolkovotech.ru) or visit the website at <http://skoltech.ru/industry>



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