

zakrat naj bi na ministrstvu za kulturo in ministrstvu
 Lanski razpis, ki je na pobudo akcijskega plana direktorata za znanost in raziskave E izšel iz sedmega okvirnega programa na oddelku
 Lanski razpis, ki je na pobudo akcijskega plana direktorata
 Na iniciativo Janeza Potočnika je komisarjat
 Tam smo na pobudo Janeza Potočnika, ki je bil takrat komisar
 Zakaj je po vašem mnenju tudi
 je kustos in selektor na mednarodnih festivalih, v Evropski komisiji pa vodi galerijo Cosinus, ki je zaradi svoje strateške pozicije pri evropskem komisarju

za
 umetnost
 Po poslušanju kolegov bi lahko rekel takole:
 Kakšna pa je pokritost področja
 Današnje divje misli so posvečene vprašanju

za visoko šolstvo
 Vendar **ministrstvo za kulturo ne podpira znanstveno-raziskovalne dejavnosti**, ministrstvo
 Prepričan sem tudi, da bi morali biti danes tu prisotni ljudje z ministrstva
 To je širši kulturni fenomen; mnenja sem, da sta obe

o in Ministrstvo za znanost in raziskave povezala in **sklenila dogovor o medsebojnem sodelovanju** med kulturno-umetniškimi in znanstvenimi projekti, ki popularizirajo
 Umetniki so namreč razumeli
 Pred kakimi štirimi leti sem na Inštitutu Jožefa Stefana organiziral konferenco na temo

... pri nas zelo žive, da je umetnost **prepoznala svojo pomembno družbeno funkcijo** v povezovanju z znanstvenim poljem in da ima pri tem lahko interes tudi

za
 tudi
 in
 Ali je pri tem prostor
 Zakaj je robotika zanimiva
 Na festivalu Ars Electronica
 Ko gre za interdisciplinarne projekte, v katere je vključena
 Robotika in animacija
 To je širši kulturni fenomen; mnenja sem, da sta obe, znanost in
 znanstvenimi projekti, ki popularizirajo znanost v družbi ter kulturo

umetnost
 ... na kakšen način lahko
 družiti vseh treh akademij bi radi ustanovili LIMAUL (Laboratorij inštituta za medijsko
 Po poslušanju kolegov bi lahko rekel takole:
 Kakšna pa je pokritost področja
 sistem strukturno prilagojen spremembam, ki jih je v zadnjih petdesetih letih doživela
 ... ali na področju raziskovalne dejavnosti obstaja prostor za raziskovalno
 pan, v svojih predavanjih in zapisih imenujete umetnost, ki jo podpirate, **raziskovalna**
 Jurij Krpan, v svojih predavanjih in zapisih imenujete
 atnik gledali malone **sumljivo**, saj so bili mnenja, da **pri proizvajanju nove znanosti**
 ni štirimi leti sem na Inštitutu Jožefa Stefana organiziral konferenco na temo znanosti
 Zakaj je pomembno, da se
 Če se navežem na umetnost: sam ne vidim toliko povezave v tem, da
 Če se navežem na
 o povezave med umetnostjo, tehnologijo in znanostjo v svetu in pri nas zelo žive, da je
 Današnje divje misli so posvečene vprašanju

je
 Če
 V prvi vrsti je treba imeti veliko znanja, nato je ključna njegova raznolikost, tretja stranica pa
 Živadinov:Zupančič::Tursič@3·10¹⁷Hz
 V Sloveniji
 Današnje divje misli so posvečene vprašanju umetnost - znanost -

za
 in
 raziskave
 EU
 kultura (in njihova dodana vrednost v družbi).
 magija.
 magija.
 prav poseben fenomen.
 - umetnost z naslovom nova renesansa.
kot orodje za svoje delo, znanstveniki pa so poslušali in molče odšli, saj niso videli raz
 pomembno, da se povezuje z umetnostjo - mogoče to pojasnjuje specifično za področje biote

umetnost
 ,
 trikrat letno prirejali razstave, na k
 izdelal triletni akcijski
 izšel iz sedmega okvirnega
 povezala in sklenila dogovor o med

ART - SCIENCE - CULTURE
WILD THOUGHTS, 3 MARCH 2011, 5 P.M., THE MINISTRY OF CULTURE RS
 družbo, je razpisal proračun tudi za projekte, pri katerih gre za povezovanje
 ter ministrstvo za šolstvo.

na ne podpira umetniške dejavnosti
 Wild Thoughts are monthly forums, organised by the Ministry of Culture in order to intervene publicly into the space of cultural reflection. The topic we are going to tackle this time is art - science - culture (and their added value in society).

na univerzitetnem nivoju in kakšne so možnosti za to?
 The links between science, technologies and art transpire in many different ways, among which the most precious are precisely those in which artists and scientists collaborate on a joint project that benefits all of them. There exist notorious examples of science fiction literature and cinema inspiring whole groups of scientists to shift the boundaries of everyday reality. On the other hand, scientists and technologists have given artists new means of expression and technologies, with which artists thematise the phenomenology of the present, reach beyond cultural boundaries and create entirely new poetics.

tehnologijo in družbo lahko vsako leto vidimo predstavitev najnovejših dosežkov robotike: 2009 so predstavili nemipoida robota, ki je naregal svojega ...
 TRANSCRIBED BY: MONIKA VREČAR
 TRANSLATED BY: POLONA PETEK
 povezuje z naravoslovno znanostjo, je
 sprijazniti z minimalno pomočjo znanstvenikov, saj jim ne uspe uresničiti
 del iste kulture, jaz tega ne ločujem.

-znanost
 -
 kultura (in njihova dodana vrednost v družbi)
 magija
 na univerzitetnem nivoju in kakšne so možnosti za to?

prepoznala svojo pomembno družbeno funkcijo v povezovanju z znanstvenim poljem in da ima pri tem lahko interes tudi znanost
 : sam ne vidim toliko povezave v tem, da umetnost uporablja orodja znanosti ali tehnologije, to je namreč samoumevno.
 uporablja orodja znanosti ali tehnologije, to je namreč samoumevno.
 sodeluje z znanostjo?
 povezuje z znanostjo in obratno?
 nastopi v točki, kjer bi se fizikalno znanje prenašalo v prakso?
 z naslovom nova renesansa.

nima kaj iskati.
 na področju znanosti in tehnologije.
 lahko v interdisciplinarne projekte vključujemo zgolj v funkciji diseminacije rezultatov, pri tem pa upamo na razumevalno recenziranje, za kar ni nobenega zagotovila, ...
), ki je za zdaj še virtualen.
 in ki vključujejo raziskave, ki odpirajo etična vprašanja, se področja po sili ločijo in

kultura
 (in njihova dodana vrednost v družbi)
 v okolju prenizka, je volumen tega bazena seveda nizen.
 etičnih komisij ni tako prezentna, kar je do neke mere prednost.

je
 Če
 V prvi vrsti je treba imeti veliko znanja, nato je ključna njegova raznolikost, tretja stranica pa
 Živadinov:Zupančič::Tursič@3·10¹⁷Hz
 V Sloveniji
 Današnje divje misli so posvečene vprašanju umetnost - znanost -

Polona Tratnik:¹ *Today's Wild Thoughts are dedicated* to the question of **art – science – culture (and their added value in society)**. The initiative for this debate has come from cultural circles. The subject is very topical and we wish to use it to point to the fact that the links between art, technology and science are very alive, locally and internationally, that art has recognised its important social function in establishing links between art and the field of science, and that this can be of interest to science as well. In Slovenia, the initiative for work in this area is very strong, and there are also some very active artists, artistic and artistic-scientific groups; however, the institutional structures for carrying out such activities are still very inadequate.

I am very pleased to have the opportunity to talk to such interesting guests. Let me introduce them:

Professor Dr. **Jadran Lenarčič**, the Director of the Jožef Stefan Institute, received his Bachelor of Science, Master of Science and PhD degrees from the Faculty of Electrical Engineering, the University of Ljubljana, where he now holds a professorship. His name is closely linked with the Jožef Stefan Institute, where he has been working since 1979 and where he was elected to the title of Scientific Councillor in 2001. From 1985 to 1994, he was the Head of the Robotics Laboratory, then the Head of Automatics, Biocybernetics and Robotics (1994–2005), and since 2005, he has been the Director of this internationally exceptionally well-established research institute. He also lectures in Nova Gorica and Bologna as well as at some other foreign universities.

Professor **Srečo Dragan**, a pioneer of video and new media, who received his Bachelor and Master's degrees in Fine Arts, holds a professorship in video and new media at the Academy of Fine Arts and Design (ALUD), the University of Ljubljana. He is the originator of video art in Slovenia. As early as 1969, with Nuša Dragan, he made the very first video in the former Yugoslavia and he was a member of the expanded group OHO at the end of the 1960s. In 2007, he received the prestigious Rihard Jakopič Award for the introduction of new media into fine arts and for achievements in this area, and in 2006, on Jožef Stefan's Day, he received an award for expanding the field of classic creative media and for establishing links between art and science.

Jurij Krpan, the Artistic Director of the Kapelica Gallery, is one of the world's most important curators, specialising in very contemporary artistic directions. He has curated international festivals; he runs the Cosinus Gallery in the European Commission building in Brussels, whose strategic position close to the European Com-

missioner for Science makes it a particularly distinct phenomenon; in 2008, as a curator of a part of the Ars Electronica festival, he introduced the artistic profile of the Kapelica Gallery, which is held in very high esteem by the expert circles around the world and which may well be the most important gallery in the world. It distinguishes itself with a very recognisable artistic credo and a top-notch production of very contemporary and research art.

Senior lecturer Dr. **Miomir Knežević** received his Bachelor of Science, Master of Science and PhD degrees from the Biotechnical Faculty, the University of Ljubljana, where he now works as a lecturer. He is the CEO of Biobank for Umbilical Cord Blood (Biobanka popkovnične krvi). Until last year, he was a researcher at the Blood Transfusion Centre of Slovenia; from 2006 to 2010, he was the Head of the Unit for Collection and Processing of Haematopoietic Stem Cells. From the beginning in 1997 to 2003, he was employed in the company Educell, one of the first and leading Slovenian institutions for tissue engineering and cell therapy (which gained the status of Tissue Establishment in 2008 from the Agency for Medicinal Products and Medicinal Devices of the Republic of Slovenia), and is therefore a pioneer in the field of stem cell research in Slovenia and worldwide. He also has numerous experiences in establishing links between biotechnology and art.

I would like to start with the topic introduced by Dragan Živadinov and Miha Turšič, namely, the culturalisation of space.² I should mention that none of our guests here are involved in space research; however, our collaborators from the Institute for Kinesiology Research at the Science and Research Centre of Koper have pointed out that they have themselves conducted pioneering research into micro gravitation, that is, research in simulated weightlessness or zero-gravity. Prof. Dr. Jadran Lenarčič, a few years ago, you hosted an event with a world-renowned guest, Gerd Hirzinger, a leading technological researcher in the field of robotics and mechatronics. From your perspective, what is the connection between space and surgery?

Jadran Lenarčič: Hirzinger is the director of the world's most important institute in the field of robotics. The first European robot, which went into space with NASA, came from his laboratory. On the basis of our analyses and studies, the robots manufactured there are also used in surgery. Lately, among other things, they have also been producing very small robots that can fly, take photos and make three-dimensional models of the most important palaces in Germany, so that a whole series of German architectural sights has already been digitalised.

Polona Tratnik: Your areas of expertise, then, are biokinetics, robotics, the kinematics of robots. In your opinion, what are the great questions concerning the field of robotics and what can we

expect from it in the future?

Jadran Lenarčič: The first robot was created by an artist, namely, Karel Čapek, in one of his plays. The movie *Metropolis*, too, drew on robots at a time when robots did not yet exist in real life (that is, in science). The first robots, which appeared in the 1960s, were industrial robots. When I started studying human movement in the late 1980s and at the beginning of the 1990s and tried to understand it from a robotic, mathematical point of view, there were even some world-renowned experts who told me that this was ridiculous, for what characterised robots was precisely that they were mechanical and that, therefore, their mechanical properties – rather than their abilities to imitate humans – needed to be developed further. Today, however, one of the main streams in robotics is precisely the so-called humanoid robotics, that is, robots imitating human movement. As for art and links to it, the fact that art uses the tools of science and technology does not seem very significant to me, for this is a matter of course. If today you asked a scientist or an engineer to make the best new robot in the world, they would first ask you what you would use this robot for, and then they would make a robot designed precisely for this purpose – with six requisite engines, for instance. An artist, on the other hand, would create a robot with three hundred engines. If, however, two people with entirely different experiences and worldviews enter into a joint project, something happens – something that I call fusion. When you combine two entirely different worlds and you force them to collide with one another, so to speak, fusion occurs, which causes an unbelievable explosion of energy, and new things open up, things that we could not have even dreamed of before. Such a fusion is precisely where I see the union of science and art.

Polona Tratnik: Art, too, is interested in robotics. Every year at Ars Electronica, the festival of art, technology and society, we can see presentations of the latest achievements in robotics: in 2009, they introduced Geminoid, a robot that imitated its creator Hiroshi Ishiguro and was capable of very accomplished verbal communication; in 2010, they showed Asimo, Honda's very skilled and flexible robot. Some top artists, such as Stelarc, are exploring robotics and incorporating it into their work; Kevin Warwick, for instance, is turning himself into a cyborg; in Slovenia, too, robotics is well represented in art: Stefan Doepner, Borut Savski, Sašo Sedlaček, Nika Oblak and Primož Novak. Jurij Krpan, why is robotics interesting to art?

Jurij Krpan: I do not know why it is of interest to any of the mentioned artists in particular; however, artists in general have always wanted to breathe life into their creations. Whenever they got the opportunity to express themselves in complex materials, that is, whenever certain types of knowledge became more easily accessible, they immediately seized the opportunity. The myth of Pygmalion is still at work today. It does not spring solely from within artistic creativity; rather, artists with their creative sensitivity respond to the changes in a society submerged in automata, machines, a wide range of interfaces and prosthetics, which enable their users to be faster, louder, more mobile, etc. Yet, despite

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¹ The event was moderated by Senior Lecturer Dr. Polona Tratnik, BA and MA (Fine Arts, UL ALU), PhD (Philosophy and Theory of Visual Culture, UP FHŠ). She is a Research Associate at UP ZRS, a Senior Lecturer in Philosophy of Culture at UP FHŠ, and the President of the Slovene Society of Aesthetics. She is the author of *In Vitro: Live Beyond the Body and Art (In vitro. Živo onstran telesa in umetnosti, 2010)*, *Transart. Culture and Art in Global Conditions (Transumetnost. Kultura in umetnost v globalnih pogojih, 2010)* and *The End of Art. Genealogy of Modern Discourse: from Hegel to Danto (Konec umetnosti. Genealogija modernega diskurza: od Hegla k Dantu, 2009)*. She is one of the world's pioneers in bioart and has been working on establishing links between art and biotechnology since 2000; recently, she has been striving to connect philosophy to natural science and art.

² At the beginning of the discussion, Dragan Živadinov and Miha Turšič introduced KSEVT (Kulturno središče evropskih vesoljskih tehnologij/Cultural Centre of European Space Technologies), an example of linkage between art, technology and science, in which art is by no means subordinate to science, but rather plays a decisive role in planning the *culturalisation of space*. We are not presenting this part of the discussion here; Živadinov and his work will be presented in the next issue of *Maska*. (Ed.)

With their creative sensitivity, artists respond to the changes in a society submerged in automata, machines, a wide range of interfaces and prosthetics, which enable their users to be faster, louder, more mobile, etc. Yet, despite this, we are often at a loss when faced with questions such as: To what extent does technology enable us? At what point does it become disabling? Or, when do we use technology and when does it start using us? Further questions arise here, and artists thematise, problematise and explore them in ways that exceed pure fascination with or fetishisation of technology.

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Recently, I have come across a text by a Japanese scientist (Naho Kitano),³ whose Italian colleagues reproached him for the difficulties they had when trying to discuss robotics with the Japanese, namely, the difficulties arising from the absence of an elaborate ethical stance as regards robotics as such among the Japanese. In the text, which he published soon after this debate, Naho Kitano explores precisely this problem and he ascertains that, in the West, robotics has always been understood as something that displaces human activity. And this *other*, which has appeared all of a sudden in this shape, produces so much anxiety that the acceptance of robotics is not a matter of course. On the other hand, the scientist claims that the Japanese have a different historical and cultural background, for, ever since their Shintoist novels, it has been clear that they believe that every object has its own spirit. A robot is thus a conglomerate of parts that, in themselves, already have spirits. Furthermore, Naho Kitano reports that their ministry has launched a programme that includes humanoid robots designed to nurse elderly people; the latter perceive them as self-evident, not as something alien. What I want to emphasise here is the importance of the type of cultural environment into which we wish to introduce certain technology. What is essential here is the type of relationship between experts and scientists, who introduce functional interfaces and machines, and people in general, who become aware of how and why they need this technology. This awareness is important and it is a cultural issue.

Polona Tratnik: In Slovenia, Srečo Dragan is a name associated with the very beginning of forging links between art and science. You were the initiator of collaboration between artists and scientists in the field of robotics, and you started collaborating with the Jožef Stefan Institute very early on. How can art collaborate with science?

Srečo Dragan: Let me emphasise the importance of the context and the time in which things take place, for they can never be understood in isolation. The 1990s are only a continuation of the early 20th century avant-garde movements and of the neo-avant-gardes of the 1960s. In the 1990s, the time was ripe for techno-art, which produces techno-imagination and inspires research that would enable humans to step out of reality and into virtual reality. In 1993, Virilio wrote that the world was occupied with virtual reality, that this was a time of great changes. Ideas appeared about the possibility of transferring human movement into an augmented reality and into virtual reality. Such was, for instance, the robot project (for the most part, the robot was simply moving the camera), when on the occasion of the exhibition of Plečnik's architec-

³ Naho Kitano, "Roboethics – a comparative analysis of social acceptance of robots between the West and Japan". <http://www.roboethics.org/atelier2006/docs/Kitano%20west%20japan-pdf>.

ture for a new democracy in Prague, we put a robot on the Three Bridges (Tromostovje) in Ljubljana, and the viewers were able to direct it, via the Internet, in different directions along the urbanistic grid of Ljubljana. As regards the latter, we know that, according to Plečnik, it is triangular and not expansionistically square, and as such, it represents some kind of a spiritual structure of Ljubljana. If people directed the robot towards Čopova street, for instance, this direction pointed towards Tivoli, where Plečnik's never-built parliament building was initially meant to be located. The other side was directed towards Žale, etc. The viewer, then, was able to move towards all these points. We had an agreement with the Prague university that the project would be carried out simultaneously in Prague and in Ljubljana; however, eventually, only the Slovenian part was carried out due to the disapproval of the Prague presidential protocol.

The second part of the project was a computer animation, which showed Plečnik's parliament building as a three-dimensional space, within which one was able to move by means of a robot. It was only with U3, whose selector was Peter Weibel, that we were able to make the robot move in the gallery space, along the grid that represented the grid of Ljubljana, and thus transpose the panorama of Ljubljana into virtual reality. This, however, was not exactly simple at the time, for we had to convince the scientists that a project like this actually fitted into the context of basic research. As soon as the Jožef Stefan Institute was able to use a radio connection to move the robot and then send the image, recorded by a camera, via the Internet back to a certain point, the link polis–mediapolis–metropolis was established.

The last shift in this story relates to the topic of the humanoid robot, which was already extremely popular at the time. We developed a computer-operated platform, which made it possible to enter different realities. The exhibition *Time is Out of Joint* at the Museum of Modern Art (Moderna galerija) involved a robot, which moved like a visitor from one point to another, to some conceptual tables; what was important in all this, however, was the fact that one could move the robot to specific points in the gallery by means of the Internet. In other words, this was a process and a research project, in which the object of investigation at the Jožef Stefan Institute overlapped with the Rhine in Bonn, where they had been conducting research into similar things; in America, this was the Minerva, whereas our robot was named Leonardo. This was not applied research; the aim of each investigation was set within its own boundaries. The software part was carried out entirely by the collaborators from the institute, we were also working together with Borut Rihavec from the Computer Vision Lab, and I had to secure 10,000 German marks for the realisation of the project.

Polona Tratnik: Jurij Krpan, you often propose initiatives for establishing links between science and art. Why is it important that art links up with science and *vice versa*?

Jurij Krpan: This need is not new, nor is it flour from my mill. As early as 1959, scientist Charles P. Snow wrote a book called *The*

Two Cultures, and in 1963, he published an essay, in which he introduced the notion of "the third culture". He ascertained that there existed a greater gulf between scientists and artists than ever before. He proposed several ways of establishing links between scientists and artists, and concluded his thoughts with the phrase "the third culture". Later on, new texts appeared proposing the fourth culture, the fifth culture, etc. This is why this phrase, unfortunately, is not so popular as we might wish, for it has been abused much too often. Anyhow, ever since we first experienced the achievements of applied science, which have so radically changed our lives, we have not been able to avoid expert, theoretical interpretations, which give us a better understanding. And artists would not be artists if they did not, all by themselves, dig into the problem, the material, the machines, take them apart and thus determine their function and purpose. In Slovenia, if we consider things locally, artists who problematised banal, commonplace objects, such as a keyboard, appeared very early. The keyboard is an invention of the 16th century, an utterly primitive one, for it limits our expression; yet, it is very useful. In the 1990s, Marcel-li Antunez Roca created an installation, an environment that was operated in a wireless mode, with movement and gestures, yet, without touching a physical interface. Thus, a bodily language developed that we had not encountered before. Similar things are happening today with mobile telephony and all other wireless devices that we use while we move and choreograph our life in a completely new way. With the new *touchscreen* mobiles, too, the keyboard is gradually dying out; the contact with the device, with the interface, is becoming increasingly intuitive. The predictions formulated in the artists' wild thoughts and in science fiction are becoming more and more feasible. Computers that we would wear on our bodies, biosymbiotic clothes that would help us regulate our vital functions, all this is already happening, as it were; however, what we have not done as yet is establish a relation to these innovations; or rather, we have an a priori relation to certain things, which fosters stupidity, lack of interest, generalisations, and it can even be dangerous.

Polona Tratnik: Jadran Lenarčič, you work primarily in the field of science; however, on several occasions, you strived to link science to art. What are the interests of science in the establishment of links between science and art? Can art appear at the point where physical knowledge is transferred into practice?

Jadran Lenarčič: Today's debate points precisely to that which I emphasised at the beginning. On the one hand, there is the artist who thematises and, to some extent, problematises new technologies, new kinds of knowledge; on the other hand, there are scientists who produce these new kinds of knowledge and we do not see this as anything special, at least not in the way that artists do. About four years ago, I organised a conference at the Jožef Stefan Institute; its topic was **science – art** and it was entitled *The New Renaissance*. I admit, I was pretty disappointed after the conference, for somehow I expected that we would be able, together with the ministry, to bring together eighty top-level Slovenian artists and scientists and that, once we started discussing these issues, this would set off a spark of interdisciplinary collaboration. As it

happened, it all seemed more like a matchstick whose fire went out very quickly. Namely, the artists understood science as a tool for their work, whereas the scientists listened and left without saying a word, for they saw no reason to collaborate with the artists. My view, however, which I defended back then and which I would like to lay out once again, stems from the perspective of creativity. In my opinion, a new idea does not develop *within* a human being; rather, it emerges at the boundary between his/her cognition and the environment. The in-between space, as mathematicians would say, is badly conditioned, which means that even a tiny change causes huge explosions. The more you enter the interior, the better conditioned it is, that is, it is less sensitive and nothing happens. If you only collaborate with like-minded people, it is difficult for you to cross over into the unknown. This cross-over happens when you encounter two different ideas. And these two ideas must collide. Of course, here, we also need to take into account social, psychological and other aspects. What is crucial here, however, is the fact that the collision of two ideas produces not one, but ten new ideas. This is the basic process of creativity and humans are only creative in this manner. Back then, with the title *The New Renaissance*, I imagined a new fluidity, which would emerge if Slovenians recreated the sphere of collaboration between scientists and artists and brought about the so-called fusion. When I spoke about this in a lecture in Austria, they dubbed this fusion *Lenarčič's cube*. I said that creativity is the volume of a pool, in which every dimension is crucial to the creative process. First, one needs to have a lot of knowledge; second, the diversity of knowledge is key; and the third dimension is culture. If the culture of an environment is too low, the volume of this pool, of course, is null. By this I mean that scientists certainly do not see artists as tools; if scientists tried to establish work groups with artists and pursue a set goal in a joint project, we could get completely new results. And this is the greatest value of these links, which can make sense to scientists, too.

Polona Tratnik: Miomir Knežević, we have been collaborating for eleven years and, in doing so, we exemplify collaboration between art and science. Why, in your opinion, is it important for science, too, to forge links with art? Perhaps you could explain this specifically with regard to biotechnology, tissue engineering and regenerative medicine.

Miomir Knežević: I can answer this question very quickly: this has to do with the person as such. Namely, I like collaborating with you, which is why many good things can come out of this. We can teach each other stuff and something new can come of it, which is what Jadran Lenarčič was talking about just now. I agree that the barrier between science and art is relatively high, especially in our minds. It is interesting that the artists have come to this meeting with notes, whereas the two of us scientists have come without them. Perhaps this means that we expect that things would no longer be so precise, tangible and quantifiable. I often notice in my colleagues, students and even myself that we feel safe if we are surrounded by things that can be measured and evaluated, that is, things that are familiar to us in this sense. If this is not the case, we can deny it or we can try giving things a use value of some sort. Sometimes, in our

investigations, we veer off course and explore things that nobody really needs. But I emphasise that things that appear useless at first sight can enable a mental breakthrough, which takes research to an entirely different level. Such breakthroughs can happen when scientists collaborate with artists, for the latter have no mental limitations comparable to those in science; artists think freely. The end result of their freedom is often far from useful, although, of course, we could now launch into a debate about the usefulness of art. In any case, such an element inspires creativity, which enables easier and better work. In science, we must break free from too much specialisation in one's own field; artists can see other possibilities of science and technology. An artist can shed completely new light on something that a scientist does not consider anything special; this can inspire the scientist to start thinking differently about his/her work; it can reshape established concepts. While I was still working at the Blood Transfusion Centre of Slovenia, my collaborative projects with Polona Tratnik were almost looked upon with suspicion, for my colleagues thought that there was no space for art in the making of new science. Later on, when these projects were well under way and I was discussing them with my co-workers, they even started viewing their own work in a different light. Jadran Lenarčič spoke earlier about similar experiences: he wanted to bring together scientists and artists, because he felt that this would benefit both, but they did not seem to feel the same. This is why it is even more important to have more meetings of this kind and to encourage as many interdisciplinary pilot projects as possible. On the basis of such experiments, interesting things can emerge and they can develop into serious projects. Above all, however, it is important that the artist can thus become an interpreter of science and its link to the rest of the world. For, in his/her enthusiasm, the scientist sometimes forgets that some things can be misused. S/he has to find the proper place for his/her activity. I have learnt a lot from Polona Tratnik; this experience has made me see my work differently and I hang around different people, I read different magazines; to me, this constitutes personal wealth.

Polona Tratnik: Miomir Knežević, you like to stress that it is important for biotechnology and biomedicine that people use their links to art as a source of information about them, about the real possibilities in science. Perhaps this also prevents them from falling prey to fear or excessive enthusiasm, that is, to emotions that can be harmful.

Miomir Knežević: The field in which I work can sometimes create a lot of ethical dilemmas, because it induces social change, albeit indirectly. Such is, for instance, the issue of cloning or the issue of embryonic stem cells... To a scientist, this is all merely technique and often the thought that other people might view this differently does not even enter our minds. Some things simply do not appear controversial to a scientist – say, a woman taking her own ovum, fertilising it with her own somatic cell and giving birth to herself. Theoretically speaking, of course. I believe we must promote discussions about why such things are problematic. When it comes to realisation, there are numerous options that a scientist finds interesting, but they can have serious repercussions. Since artists see these things differently, they can introduce reservations

into scientific discourse, while they also enable scientists to see things differently.

Polona Tratnik: Despite the fact that the interest in establishing links between art and science is strong, the path that leads towards them is thick with difficulties and one of them is certainly the institutionalisation of these links. Jurij Krpan, in your lectures and texts, you describe the kind of art that you support as research art. In Slovenia, we have ARRS, the Slovenian Research Agency, which performs professional, development and executive tasks related to the National Research and Development Programme within the frame of the valid budget memorandum and the state budget, as well as other tasks that promote research activities consistent with the agency's purpose. In the field of research activities, is there space for research art? Is the state system, or rather, the European system, structurally attuned to the changes undergone by art in the last five decades, especially art that is strongly related to natural sciences as well as the humanities and social sciences? Let me add that you were one of the initiators of a huge call for proposals with the European Commission for projects linking art and science, which was announced last year and which, in spite of its complexity and exacting criteria, received a very large number of applications from artistic-research groups, which surprised the people in the European Commission. What are the institutional chances of such practices being carried out in the future?

Jurij Krpan: It must be emphasised that we strive for collaboration and not for instrumentalisation of one or the other. Our initiative was a spin-off of sorts, starting at the Kapelica Gallery and going straight into the building of the European Commissariat in Brussels. As Janez Potočnik, then the Commissioner for Science and Research, suggested, we organised exhibitions there three times a year, in which we presented artists that do this sort of art. The Ministry of Foreign Affairs and the Ministry of Culture assisted us in this endeavour. While this was a very exotic initiative, we managed to shift a great many things relatively quickly. The shift happened in just three years. This was not just about the exhibitions; rather, several steps were crucial. One of them was the booklet entitled *Art and Science: Creative Fusion*, which we published together with the directorate and which was organised thematically; its purpose was to show the world of science what links between art and science should be like. I also collaborated in a few workshops organised by the directorate. One of them took place in the department of materials; its topic was communication of nanoscience, that is, the science of nanotechnology. We immediately came into conflict there, for they were showing beautiful *renderings* of the dynamics of various atoms, whereas I kept nagging them that we need to forge links, open new laboratories, search for possible connections, etc. And now we have reached the purely practical level. We were unable to institutionalise our experiments in a way that SymbioticA in Australia has done; they now have their own studio at the faculty of medicine. Our artists, however, found access to scientists on their own and in various ways, and they started collaborating with them, creating so-called mini consortia, which we at the Kapelica Gallery facilitated as

If you only collaborate with like-minded people, it is difficult for you to cross over into the unknown. This cross-over happens when you encounter two different ideas. And these two ideas must collide. Of course, here, we also need to take into account social, psychological and other aspects. What is crucial here, however, is the fact that the collision of two ideas produces not one, but ten new ideas. This is the basic process of creativity and humans are only creative in this manner.

Within the university, we have managed to establish a module that brings together scientific thinking and artistic concepts. A project is initiated by a student of the academy and then a work group is established, which decides to carry out the project because of their own affinity to it. Since these are interactive new media projects, they are carried out in the Computer Vision Lab at the Faculty of Computer and Information Science. These connections have proven very successful; every year, at least ten different interactive projects are completed.

much as possible. Yet, because of our financial “undernourishment”, we continually found ourselves in the role of “scroungers”, merely stealing time and money from scientists who do not have enough time or money to begin with. The trouble, then, is the fact that, every time you enter a consortium, you do not enter as an equal partner, but rather as a scrounger. Eventually, of course, this affects the project; nobody has the time to ask important questions, such as those concerning the already mentioned ethical dimensions. On Janez Potočnik’s initiative, the EU Commissariat for Science and Research drew up a three-year action plan, which included support for collaborations between art and science. In Slovenia, such recommendations and options are still lacking; namely, if a consortium of artists and scientists were to be established, artists would not be able to join as equal partners, for they do not have the scientific qualifications and education inevitably required by those who write calls for proposals. There are examples of successful applications in which artists are concealed despite the fact that they play a crucial role in those consortia. There are only two relevant calls for proposals in Slovenia to which artists can apply – the call for projects that promote science and the *Night of Science (Noč znanosti)*; the money available for these projects is scant and the wording of the calls for proposals is so limiting that it prevents artists from developing serious projects. The recommendation of the European Commission was to find a way for purposive financing, which would be proportionate to the financing of scientific projects. For the budget for cultural projects, compared to the one for scientific ventures, is insignificant. Last year’s call for proposals, which was issued on the initiative of the action plan of the EU Directorate for Science and Research as part of the Seventh Framework Programme at the Department of Science and Society, also included a budget for projects that entail establishing links between science and art; it was a budget of €2,500,000.00. At first sight, this was a nice sum; however, this was a one-off, pilot project. And it also turned out that the writers of the call for proposals themselves did not have a clear idea of what kind of projects they were actually calling for; the megalomaniacal requirements included ten different partners from ten different countries for each three-year project; given this, the budget was obviously inadequate. It turned out that the call for proposals was written for the big players on the scene; the subsequent surprise, utterly patronising, about the fact that the Kapelica Gallery did not turn in an application was of course totally out of place; when we wanted to establish a consortium with serious players, they teamed up with even bigger players, such as Ars Electronica, various museums of science and technology, the ECSITE network of European museums of science, etc. Irrespective of that, only two consortia got financed while there were forty applications, and if every consortium had only ten partners, this means that there were four hundred applicants. When this year in Brussels the ECSITE network invited us to collaborate with them, I asked them how on earth they even found the Kapelica Gallery. They said that our name had been mentioned on several occasions, but above all, they were told, unofficially, that the pilot call for proposals had been met with extraordinary response, that there was a lot of interest in collaborations between artists and scientists, and that the way for such collaborations should be cleared. The Com-

mission suggested to the Director of ECSITE to include collaborations with artists in their applications to various calls for proposals (regardless of the fact that these calls do not concern art and science) and thus exert pressure to get regular financing for last year’s pilot project. This is one option. I also believe that our discussion today should include people from the Ministry of Higher Education, Science and Technology and the Ministry of Education and Sport. On a different occasion in 2005, we collaborated with the Ministry of Transport and the Ministry of Higher Education, Science and Technology; despite the fact that they had endorsed our project (the fifth triennial of contemporary Slovenian art at the Museum of Modern Art), we found out that there was no legal possibility for us to get the subsidy that had been earmarked for us. The Ministry of Culture and the Ministry of Higher Education, Science and Technology then decided to get together and conclude an agreement about mutual collaboration between cultural-artistic and scientific projects, which promote science in the broader society and culture and art in the field of science and technology. The proposed agreement, which we prepared then, has been at a standstill for six years; however, if the two ministries concluded the agreement, this could be the first step towards financing such projects. I am glad that today’s *Wild Thoughts* are taking place, for I am certain that the public needs to be informed about such dilemmas and that these dilemmas need to be tackled even more vigorously, and also at the level of formalising these links.

Polona Tratnik: Jadran Lenarčič and Miomir Knežević, you both know the world of science very well. In your opinion, what kind of options should there be for institutionalising the links between art and science? The usual path that brings artists and scientists together has the artist approach the scientist; if s/he is lucky, the scientist is sufficiently open-minded and willing to collaborate. Then, however, things get complicated, for artists have a lot of will and perhaps a lot of time, too, but their knowledge of science is rather poor. On the other hand, scientists are caught in their work structures, in programme and project frameworks, and they usually do not have much time or space for any other commitments. Accordingly, the majority of artists who are interested in collaborating with scientists and who are lucky enough to have met the people who are open to art must reconcile themselves to getting minimal assistance from the scientists, for they are unable to produce complex structures of collaboration. Furthermore, all lab work must be authorised; there are also financial limitations, for this kind of research is rather costly; the supporters of culture demand more and more productions, etc., etc. In short, a whole series of problems makes the situation very difficult. What are the realistic possibilities for a settled form of collaboration, where should we start changing the system and how?

Jadran Lenarčič: I am very glad that, as yet, no one at this round table has suggested that the Jožef Stefan Institute is to blame for the lack of money, that the institute gets all available funding. Let me emphasise that Slovenian scientists are organised through projects. This means that we do not get any money from the budget; funding is allocated to projects. If an artist turns up and suggests working together on something else, the scientist

is usually forced to reply that s/he has no time, for s/he needs to work on a project. This is one aspect of collaboration between artists and scientists. The other aspect could be articulated as follows: if a scientist decides to collaborate with an artist without knowing what kind of results s/he may expect, s/he is likely to panic. The reason for this panic is the fact that, in the meantime, his/her colleague next door will publish a scientific monograph based on his/her research and thus win a new project at the next call for proposals, whereas our scientist will not. Indeed, the Jožef Stefan Institute has a lot of employees, 930 to be precise, 750 of which are scientists; however, five hundred of them are employed on contracts that expire at the end of their projects. If a researcher does not get another project, they are out of work. In such circumstances, one cannot afford being reckless. Despite this, I believe, also on the basis of my own experiences, that there are potentially huge possibilities for collaboration and that, reasonably, Slovenia should show more courage in this sense and issue a call for a serious project, such as the Centre Pompidou. If we do not do this, we will remain small and everybody will keep collecting resources for their own projects, while we will never even get to bigger projects. This is a broader cultural phenomenon; I believe that science and art are both part of the same culture, I do not draw any distinctions here.

Polona Tratnik: Yet, the Ministry of Culture does not support scientific research activities, whereas the Ministry of Higher Education, Science and Technology does not support artistic activities.

Jadran Lenarčič: Let’s leave the ministries aside. The ministers may be divided, but this does not necessarily mean that we are divided, too. I am joking again, a little. I am afraid, though, that participation in such interdisciplinary projects is all but impossible. We do have CRPs (ciljni raziskovalni programi/target research programmes) that could enable the realisation of such projects; however, this would require strong political will.

Polona Tratnik: Let me mention that I work in the field of the humanities and that we are currently involved in projects in which we link the humanities to biotechnology, biomedicine, biology and kinesiology. In short, these projects involve interdisciplinary links. However, we have come to the conclusion that calls for proposals usually do not allow art to be part of the projects. Art can be included in interdisciplinary projects only as a means of disseminating the results, and, even so, one needs favourable reviewers, which is hardly a matter of course, and there is no formal basis to support this kind of interdisciplinarity or even transdisciplinarity.

Miomir Knežević: Sometimes it is difficult to establish an apparatus whose wheels are turning differently, and if you try to do it by force, it can all fall apart. However, I must emphasise again that institutionalisation, initially, often brings disappointment, for a lot of energy is invested into bringing together the two poles of the magnet. Where there is interest at a personal level, you find a way to collaborate and this sets a good example for future projects of this kind. The trouble, however, is that the price of scientific projects is usually extremely high, which is why it is difficult to

persuade scientists to collaborate with you if artistic objectives are all you have got. If, however, you offer an artist an insight into scientific projects, s/he may see interesting things in them and s/he will use them in his/her own artistic research. This is the way we have worked thus far. If collaboration had been carried out by decree, however, we would have probably run out of motivation on both sides. This is why I stress the importance of collaboration at a personal level. And we should use such models to show younger generations how it is possible to work outside of established frameworks and we should encourage further work in this direction. As Jadran Lenarčič has mentioned, the difficulties accompanying the establishment of collaboration are usually related to our small-mindedness. Important examples to follow are found abroad; there, we can find utterly different models of thinking. In the end, however, institutions matter; they secure money, they render such research tangible at a national level, they communicate with the citizens, etc.

Polona Tratnik: Srečo Dragan, you have a lot of experience with work within the university. How is the field of **art – science** dealt with at the university level and what kind of options are there for work in this area?

Srečo Dragan: After hearing my colleagues, I could say: **art – science – magic**. It seems so impossible at first sight. For my part, I believe that techno-art produces techno-imagination and that it necessarily leads to successful linkages. Within the university, we have managed to establish a module that brings together scientific thinking and artistic concepts. A project is initiated by a student of the academy and then a work group is established, which decides to carry out the project because of their own affinity to it. Since these are interactive new media projects, they are carried out in the Computer Vision Lab at the Faculty of Computer and Information Science. These connections have proven very successful; every year, at least ten different interactive projects are completed. The Faculty of Computer and Information Science does not offer this subject, so this collaboration is not institutionalised; however, they do have the conditions for modelling visual communication and they do carry out interactive modules. At the university level, then, such projects do exist. Students are very interested in team work with participants having different competences and responsibilities. The students involved in new media projects construct their own kind of collaboration between the author and the producer. Over the past ten years, which is how long these projects have existed, everything points to a successful development of such collaborations. And they could be developed even further within the frame of university institutions. Following the integration of all three academies, we would like to establish LIMAUL (the Laboratory of the Institute for Media Art), which, for now, exists only virtually. In my opinion, techno-imagination is interesting for artists as well as scientists. Surely, scientific work, too, requires entering a purposeless field; this, of course, constitutes basic research. I am an optimist as regards linkages between artists and scientists; we are doing good work developing the system of linkages.

Polona Tratnik: Miomir Knežević, you are one of the key figures in the field of stem cell research in Slovenia. Recently, you have made a major transition from research to business activities. You have become the CEO of Biobank for Umbilical Cord Blood and thus entered the sphere of business. Does this decline in basic research and the intensification of applied science and orientation towards immediate economic effects constitute a Slovenian, perhaps a European or even a global trend? In your opinion, are business and research mutually exclusive?

Miomir Knežević: No. I can say for myself that I have always oscillated between different disciplines. I had been a CEO before, then I was a teacher at school, I even worked at a kindergarten. I could say that I have never been very conscientious about developing my career in a classical way, that is, by specialising in a single branch. On the one hand, I think it is good to enter the sphere of business every now and then, for this enables you to see the other side of science, which can be very brutal and market-driven. Namely, it is difficult to afford developing products that no one would buy. On the other hand, there are not many business companies that are not organised in a way that is consistent with current trends, which is very opportunistic; as such, business companies contribute no added value. A corollary of this are the attempts to make scientific and research achievements applicable enough for the market to accept them. The market is the ultimate verification of a good product. Projects are similar in this sense. If nobody wants to buy your project, there is probably something wrong with it. Business companies have the option to operate globally and without limitations confronted by those who work in public institutions; as a result, some projects can go quite far in this respect. It is also true, however, that people usually notice only success stories, not failures. And failure in business is very harsh. What you have been building for several years can go to rack and ruin very quickly, the company goes bankrupt, the people whom you had previously invited to collaborate with you must be sacked – these are painful experiences. It often turns out that people in Slovenia are not prepared to take personal responsibility and take risks. But this is a key dimension of this kind of work. Some people say that I do not always act rationally; however, I believe that business gives me much more creative freedom and I wish to carry through some of my ideas.

Polona Tratnik: And re-establish the links between economy and research.

Miomir Knežević: Absolutely.

Polona Tratnik: Is there space for art in this?

Miomir Knežević: I certainly think so. I work in what might be called a fringe area, for it is strongly related to ethics. We store umbilical cord blood, which makes us a unique phenomenon in Slovenia. Public debates about this are usually very inflated, either positively or negatively, while the truth, of course, is somewhere in between. People are divided, they often do not understand scientific progress, and many a time they can reject perfectly sound

ideas. Of course, explanations in scientific discourse are hardly intelligible to them, whereas explanations in commercial terms often lead to the conclusion that the person behind the idea wants to make profit from it. Artists can function as go-betweens here, for in the sphere of ethics, which is extremely delicate, they can make sense of certain things. You need to be very careful when you communicate with other people, particularly if they are in a hormonally precarious state, like pregnant women. This is a great challenge and I believe that it can be tackled more successfully in collaboration with artists.

Polona Tratnik: Let's stay with the issue of ethics for the end of this meeting. Every project in the field of biotechnological research must obtain ethical clearance from the National Ethics Committee. Different states handle ethical judgement in different ways. In Serbia, for instance, ethical issues are solved institutionally (that is, within a particular institution), which was also standard practice in Slovenia a while ago; similarly, in the United Kingdom, there are institutional ethics committees, which confirm or reject research proposals, even PhD theses, and they handle the field of the humanities, too. When interdisciplinary projects, which include art and whose investigations raise ethical questions, are considered, the fields are forcibly separated and the scientific research part of the project is ethically assessed according to the familiar procedure; as regards artistic segments, however, things are a bit blurry. The question of ethics in relation to art is distinct. We had no problems getting ethical clearance for the biotechnological part of our project *Hair In Vitro (Lasje in vitro)*, whereas its artistic segment bewildered the ethics committee. Jurij Krpan, what is your stance regarding ethical issues and their treatment in relation to art? In London, a single gallery was given state consent, that is, permission, to display live tissues. You were thinking about proposing an initiative to establish an ethics committee for the field of art.

Jurij Krpan: In fact, this was Miomir Knežević's idea. Through our collaboration with him, we figured out that a scientist could reach the limit of legitimacy and legality and could not go further; in Slovenia, it is extremely difficult to go beyond this limit. This limit, however, and perhaps even the area just beyond it, is precisely where we, artists, usually move. The history of the Kapelica Gallery has taught us that a lot of projects that would not get clearance from any ethics committee could be carried through. In Slovenia, the culture of ethics committees is not very present, which is an advantage to some extent. However, when we try to establish ourselves as equal partners to scientists, we need to enter a dialogue with a certain morality, which is a cluster of common social agreements. When this happens, we wish to assume our share of responsibility. I shall not say that the projects that have been carried out until now have not been done responsibly, for we have always ensured sufficient expert knowledge and safety; we have not, however, consulted ethics committees. In fact, we could ourselves establish an ethics committee, consisting of representatives of religion, political parties, other experts... Of course, its members would need to be suitably informed about things that they would make decisions about. This could be the first step,

which would show that we are socially responsible and mature enough to enter a broader process of the production of meaning, knowledge, values, etc. And the opinions of this ethics committee could serve as an excellent starting point for national committees responsible for specific areas. Perhaps an interesting thing to consider here is the question of how to form such a committee.

Polona Tratnik: We have reached an interesting closure that provides food for thought and can serve as a basis for future work.

Jurij Krpan: I would like to draw attention to another thing, which is related to our structure of education. I believe that, at the level of education, our country is very non-progressive and we are as yet very far from establishing a high school for media art, comparable to those at the faculties of architecture in Cologne (Hochschule für Medienkunst) or Oslo. I have lectured at those institutions and I can tell you firsthand how things work there. Those are serious institutions with progressive departments and equipment and they are integrated into the development processes of advanced societies. In this way, too, that is, by establishing schools such as these, the society gives a clear signal to future generations. Representatives of education should participate in this debate. For instance, while we do have the faculty of music and the faculty of theatre, radio, film and television in Slovenia, there is not a single department in the entire country that would study electro-acoustic music or contemporary music or explore sound in this manner; not to mention the establishment of links between music, theatre and visual practices. In my opinion, this is where radical changes are needed.

Miomir Knežević: I would like to add this: the point of ethics committees is not to act as a censorship board, but rather to formulate credible opinions and offer safety, guidance and advice to artists. In science, too, if we take medical ethics as a starting point, ethics committees exist because sometimes, driven by the desire for scientific progress, we forget some other aspects that concern human dignity and safety. An advisory body can make your work and life much easier. God forbid, however, that we should engage in censorship, for this would put us straight back into the Middle Ages.

Polona Tratnik: My question was intended to be a bit provocative, for ethics committees in the humanities, as the UK example demonstrates, are turning into censorship boards. The question of ethics committees should probably be thought through carefully lest the initiative – which is primarily meant to enable a formal organisation of the complex links between art and science, which involve research in art and artistic dissemination of scientific results, particularly in sensuous ways – should turn into its opposite.