

Firma i3D

Company I3D Sp. z o. o., transformed into I3D S.A. on 2 March 2011, was created in 2007 by the enthusiasts of virtual reality: Jacek Jedrzejowski - President of the Board, **Arkadiusz Patryas** – Vice-President of the Board and **Marek Koźlak** acting Director of Technology Development. Marek Koźlak is also a doctoral student at Silesian University of Technology in Gliwice in the field of mechanics. The I3D team consists of the best programmers, designers and graphic designers, mostly from Silesian University of Technology (scientists and students), who have found a workplace in a relatively young company, giving the possibility of fast professional development, acquiring new qualifications and satisfaction with work performed at the highest world level.

I3D Group – the VR¹ branch leader in Poland and Central-Eastern Europe – is a group of companies involved in the development of virtual reality technology. The main service offered by the company are VR applications created for individual orders. The second and relatively new area of the Group's activity is creation of authorial VR software for projection of interactive pictures on interactive floors and multitouch tables of Touchwise series. The company also offers a software for creation and projection of the real-time 3D graphics named Quazar 3D. The entrepreneurs of I3D say about themselves: *"We provide services in the area of computer graphics. We create **interactive and three-dimensional visualizations** of any objects. Our **animations, 3D presentations, configurators, simulators, interactive Web sites** are used among others for presentations, trainings, in sales and marketing or design."*² This general and synthetic summary of the company's activities makes it very difficult for a layman to understand its actual capabilities. I3D is the only company in Poland *"which offers fully interactive, three-dimensional visualizations and presentations of any models and objects such as buildings, structures, equipment, production lines, means of transport etc."*³

The technology, which the company offers to its customers, is one of the most modern in the world and allows a full representation of the real world in virtual reality, so its application is almost unlimited. Some of the fields where it can be used are: **security** in a broad sense (objects or regions), **sales** (showing the product and its capabilities before its creation), **marketing and advertising, product promotion** (e.g. yacht, tank, aircraft or specialized equipment without need of its transportation to a fair or a customer), **design** (e.g. of one's own house, apartment, furnishing it completely virtually), **industrial design, education** (teaching aids, virtual tests, practical exams and lectures), **culture and entertainment** (e.g. virtual museums and walks), **medicine or engineering**, to name just a few. The technology offered by I3D allows, among others, to: verify a construction at the stage of its design, test functionality of model objects, learn to operate technological lines prior to their creation, use non-existent or just designed devices, visit distant, dangerous locations or places hard to reach, such as mines, desert canyons or the cosmos, but also close as Zabrze or Rybnik as well as to model behaviors in situations of natural disasters or other threats.

1.1. Sources of success and innovation

From the beginning the specialists of I3D were fascinated with possibility of the most accurate representation of the real world in the virtual world, showing cause and effect, tracing complicated processes generally inaccessible to observers. It seems that the source of innovative ideas of projects realized by I3D are: fascination with the surrounding world, desire to understand it and transfer this knowledge to others in an unprecedented form, allowing to go deep through the layers or tissues of a presented object as well as intention to show the principles of operation of objects or organisms, taking into account many variables. Moreover, the I3D team in order to invent new topics of tasks uses 3D and VR technologies which involve free imagination and allow looking for its use in places unexploited so far.

¹ virtual reality

² <http://www.i3d.pl/>

³ <http://www.technopark.gliwice.pl/index.php?doc=high-tech>

The career of 3D and VR technologies began with the entertainment (game consoles) and movie. Then people started to use them in marketing and sales and now they serve also in promotion (of cities, regions) and science. An undoubted proof are scientific and research projects realized by I3D, namely "Interactive Engineer Education" or authorial company's presentations prepared for students of medical and veterinary schools.

Each project of I3D is figuratively and literally a clash with reality. Taking into consideration, for example, representation of a human heart, experiments on animals, operation of complicated technical equipment or production lines in the technology of virtual reality (VR) it is necessary to thoroughly understand the essence of the object's operation, the processes occurring in it as well as dependencies and rights to which they refer. This problem has been overcome by involving external experts. In every project the company's designers, programmers and graphic designers cooperated with professors from familiar research centers.

• Technology

The concepts of virtual reality (VR) and 3D technology are for some time universally recognizable. Currently this market value is estimated at 80-100 million dollars and its rapid growth is expected. VR is the most commonly used *"in research and development and project works (e.g. in visualization of models), in training and education (many systems customers are e.g. technical and medical universities), industry (e.g. as a tool improving creation of production processes or affecting the improvement of the production quality) as well as in marketing and entertainment."*⁴ Every day modern technologies in the field of VR and 3D are gaining wider and wider group of supporters. The innovativeness of the tasks realized by I3D is an appropriate adaptation and development of an available technology into a product tailored specifically to the customer's needs. The best example is the set of presentations developed for the Faculty of Mechanical Engineering of Silesian University of Technology. The company, in cooperation with university lecturers, is developing visualizations of objects with various degrees of construction complexity, which are exactly adapted to the curricula, allowing students to faster and better understand the presented technical and engineering problems and cause-effect sequences dependent on variables.

1.2. R&D activity and cooperation with the academic community

The owners of I3D, having previously big experience in other areas of business, from the beginning attached importance to the company's rapid growth. Their idea of success was simple - ambitious and innovative projects, all in record time and at the highest world level - and allowed the company to enter on the global market. This ambitious plan was successful and to the company's offer primarily answered foreign companies such as Boeing and Saudi Aramco. Then the company's offer became interesting for Polish customers: governments, business organizations, academic centers and many others.

In the first half of 2011 I3D Group employs over 30 employees and, keeping pace with the constantly changing technology, continues to grow fastly. The variety of applications, multidirectional business development and EU funds gained for the implementation of individual projects made it necessary to create a holding company, where the Group's principal activity is simultaneously run in the area of creation of interactive 3D visualizations and development of Quazar 3D software while in the created companies individual projects are being developed. The group of companies dependent on I3D S.A. (mother company), which owns 99% shares in all created subjects, consists of the companies indicated below.

- **Virtual Reality Laboratory Sp. z o.o.** - its main purpose is to conduct research and development works in the field of interactive 3D graphics. One of the first successfully completed tasks was creation of an Internet platform in the form of interactive map of the city - **eCity**, while the first realization, in form of an interactive map showing the investment areas

⁴ *i3D idzie po kapitał na giełdę z GoAdvisers*, 20 January 2011,
http://www.facebook.com/i3D.VR#!/note.php?note_id=103323566410544&id=131522663561857

was made in 2010 for the Municipality of Rybnik. The eCity project is currently in the phase of commercialization.

- **I3D Home Sp. z o.o.** (the iHome brand owner) - the company manages www.ihome.pl portal which allows virtual walks through newly built apartments and their arrangement on-line. Apart from the Polish version of the portal a Hebrew version available in Israel was created as well. The iHome project has just entered into a phase of commercialization.
- **I3D Science Sp. z o.o.** - develops educational applications and products for schools and universities. The company's flagship project and one of the first implementations is a set of exercises in form of an interactive 3D animation, simulating physiological processes of animals.
- **I3D Network Sp. z o.o.** - the company creates a network of interactive advertising surfaces in form of interactive TouchWise floors managed in Digital Signage system through a Web portal.
- **I3D Med Sp. z o.o.** - is the youngest company in the Group established to implement the project "Medical Information Portal". It is a Web portal, where medical information will be collected, stored and processed by its users in order to share it with cooperating doctors. The portal, through the Internet and its mobile version (e.g. in a mobile phone), will be available from anywhere in the world.⁵

The founders of I3D decided to take advantage of the Scientific Technological Park "TECHNOPARK GLIWICE" where the company is situated from the beginning of the Park's activity.

In the framework of cooperation, as well as due to their own needs, the **Virtual Reality Centre** was created by I3D in the Technopark and equipped with the latest available equipment such as 3D projection systems and teleconferencing systems. Noteworthy is also the unique in Poland, and one of the few in Europe, cinema and presentation room with ConCave cylindrical screen for projection in 3D, accomodating 28 people, where trainings, business meetings and presentations for customers and students take place.

Currently the company continues working on its main products and develops projects in the subsidiary companies, winning more and more satisfied customers. With every order the specialists from I3D are facing new challenges, giving opportunity to develop and expand the know-how of the company. Particular importance, prestige and huge potential of development on the Polish market of science are the features regarding two projects carried out by I3D - **Interactive Engineer Education** - a unique and innovative project developed in cooperation and to order of Silesian University of Technology as well as the cooperation with Medical University of Silesia (SLUM) which is currently being discussed. The project of SLUM would be implemented in the framework of the Education of the Future program. **Interactive Engineer Education** is in the implementation phase. The effects of I3D work have already been experienced from 2011 by students of the Faculty of Mechanical Engineering of Silesian University of Technology, which will certainly affect the change of Polish universities in the approach to education program and teaching aids used at universities.

The pace of development of the company is so fast that its owners decided that in the second quarter of 2011 I3D will debut on NewConnect market⁶ and already "on 2 March 2011 the Group will transform its legal form from the limited liability company to the joint stock company, thereby changing its name to i3D S.A."⁷

▪ Searching for market niches.

Not so long ago, when the company I3D was founded, the 3D technology was a very interesting, but still a niche product, which was available only to a few and, what should be noted, those who could invest real funds in it. The 3D technology was rather associated with entertainment (movies, games,

⁵ The company's own materials provided by Ms Małgorzata Szejka – Assistant of the Board of I3D S.A.

⁶ *i3D planuje w drugim kwartale 2011 roku zadebiutować na NewConnect*, 11 January 2011, <http://kredyt.pro/i3d-planuje-w-drugim-kwartale-2011-roku-zadebiutowac-na-newconnect/13289/2011/01/11>

⁷ *i3D S.A. – pierwszy krok zrobiony*, 9 March 2011, <http://mediamikser.pl/blog/list/index/id/92,firma-i3d/page/1>

platforms, gadgets), than science and business. The founders of I3D believed that in the near future virtual reality (VR) and 3D technology will be more appreciated and will be accessible to a wider market. And although in the world 3D technology projects in a broad sense are increasingly common in marketing, advertising, sales or in process of designing and I3D company can not complain about the lack of customers or orders, e.g. from giants such as Boeing, Exxon Mobil and Saudi Aramco, this path in Poland is just beginning and, it must be acknowledged, it shows great promise.

The niche, where the company I3D has placed its services is **creation of VR applications to individual orders of customers**. The company's customers receive a product based on their requirements and expectations. They do not have to adapt ready-made, standard solutions, buying additional "overlays" for the programs, because the product received from I3D is original, exceptional and unique, exactly adapted to the client's needs. The I3D owners consistently and thoughtfully choose next target groups of their offer. It is very important especially in Poland, where the technology offered by the company is still expensive and not so common as in the USA. However it should be mentioned that a group of its supporters is growing systematically in the non-entertainment industry (the offer of such products can also be found in the company's portfolio). The owners of I3D think about development of their company based on ambitious projects. Therefore they are looking for clients in branches not so obvious and popular in the area of VR and 3D. Namely, they address their offer to the local governments and scientific communities of Polish schools and universities, not to mention business.

■ Cooperation of science and business.

From the very beginning of the company's life it was clear that I3D will be associated with scientific communities in Poland and abroad. It was one of the reasons why the company has begun a close and dynamic cooperation with Scientific Technological Park in Gliwice and Silesian University of Technology in Gliwice and has signed a permanent cooperation in R&D projects agreement with IBM's Deep Computing head office in Houston, where, under the auspices of IBM specialists, the company develops innovative projects in the field of medicine (Interactive Human Atlas) and modern forms of communication (Classes Without Borders).⁸

The first common project of I3D with Silesian University of Technology, opening the cooperation, took place in October 2007, at a symposium organized at the University of Gliwice, for which I3D created the first **Virtual Reality Laboratory**.⁹ Currently, the Laboratory, which serves as a research and development center in the field of virtual reality, mixed reality and 3D graphics technologies, serves to the students of Silesian University of Technology who every day use the unique in our part of Europe 3D projection systems and computers with software allowing to create interactive models in 3D. In the Laboratory it is possible to carry out teaching classes and scientific circles with the latest technologies.¹⁰

The origins of I3D are also associated with an innovative project showing scientific passion of the team, opportunities and direction of the company's development. It is about creating in 2008 on the basis of products of a consortium of companies "Microsoft, Christie Digital, NVidia, Philips and Hewlett-Packard (hardware suppliers) of the first in Poland and in this part of Europe **Centre of Interactive Visualizations IDC - Interactive Digital Center**. In the framework of this investment, worth over 4 million euro, complex hardware solutions for interactive 3D presentations were installed in the technology park, including the only one in Poland cinema hall with ConCave cylindrical screen".¹¹ More than 50 posts to create a virtual reality were provided as well.

⁸ Nasi partnerzy, <http://www.i3d.pl/>

⁹ Szkolenia i operacje chirurgiczne w rzeczywistości wirtualnej, 3.10.2007, PAP, <http://wiadomosci.gazeta.pl/Wiadomosci/1,80353,4544206.html>

¹⁰ Politechnika Śląska, <http://i3d.pl/page486.aspx>

¹¹ Firmy High-Tech, <http://www.technopark.gliwice.pl/index.php?doc=high-tech>

■ Development of cooperation.

In subsequent years, I3D continued cooperation with academic community and realized authorial issues related to scientific projects.

One of the first projects (September 2009) implemented by I3D for the Polish education system (especially for medical and veterinary universities etc.) was to develop a set of interactive experiences, hitherto carried out on laboratory animals. For financial reasons (obtaining animals) and taking into account the ethical arguments, universities often limited classes, where students could directly observe the basic reactions, reflexes and physiological dependencies of animals in living organisms. A set of exercises developed by I3D allows full view of a living organism, without use of live animals for this purpose. Moreover, according to Jacek Jędrzejowski – President of the Board of I3D – *"you can perform experiments on living organisms only once. In addition, you can not stop this experience to show something that is interesting at the moment, you can not go deeper to the level of tissues and show (...) that such a situation is going on, but in our technology it is possible. We can show what is happening at the moment, stop and rewind and show it again, to show something which is the most important from the point of view of science or learning."*¹²

The packages of available experiences prepared by I3D in substantive cooperation with the workers of Medical University of Silesia (SLUM): Joanna Lewin-Kowalik, PhD., Halina Jędrzejowska-Szypułka, PhD. and doctoral student of SLUM - Adam Właszczuk¹³, include a full program of exercises in the area of anatomy and physiology, obligatory in the universities. Students have the opportunity to observe in the virtual world the process of preparing animals for research, anaesthetizing them and connecting to specialized laboratory equipment. Through the exercises students become also familiar with structure of the systems (nervous, muscular and cardiovascular), their operation and dependencies between them. In addition, the program provides the opportunity to perform experiments on the examined organs (e.g. the impact of temperature on the heart's work) as well as testing the organism's response to various substances (e.g. adrenaline, acetylcholine, potassium and calcium ions). The developed set of exercises provides the opportunity to examine a three-dimensional frog, rabbit and rat. With special glasses a student has a sense of a deep image and reality of performed operations. The product offered by I3D has another advantage, principally unavailable while working on laboratory animals, already mentioned by the President of the Board of I3D: it is possible to stop the performed experiment, discuss it, correct any error and continue working. Exercises can be repeated many times until obtaining a satisfactory result.¹⁴ A set of virtual classes is not the last word of I3D in this field. The works on their continuation and extension of offer (human atlas in VR technology) are pending.

In 2010 I3D got involved in a project of unprecedented scale in Poland - creation of **The Technology Park - Multimedia Town** – a project implemented in Nowy Sącz, announced by enthusiasts as the second Silicon Valley.¹⁵ For the realization of the project 95 million zloty has been obtained from the EU, while a total value of the investment, including modern office infrastructure, laboratories of virtual reality, post-production etc. was about 140 million zloty. The aim of the project invented by **Wyższa Szkoła Biznesu - National Louis University in Nowy Sącz**, is to support Polish companies of the multimedia branch.¹⁶ Construction of The Multimedia Town will be completed by 2012.

One of the first and essential elements of the project "The Multimedia Town" is the **Cluster of Multimedia and Information Systems** (MultiKlaster) created in 2007, bringing together, apart from

¹² <http://www.tvp.pl/katowice/informacyjne/aktualnosci/wideo/7-lutego/3925122>

¹³ These persons were responsible for substantive preparation of the project's scientific contents.

¹⁴ *Doświadczenia na wirtualnych zwierzętach i3D*, <http://mediamiks.pl/blog/list/index/id/92%2Cfirma-i3d/page/1>

¹⁵ The details regarding this project are available at Web sites: <http://multiklaster.pl>, www.miasteczkomultimedialne.pl and <http://www.skyscrapercity.com/archive/index.php/t-517536.html>

¹⁶ Anna Maria, *Rusza budowa Parku Technologicznego - Miasteczko Multimedialne w Nowym Sączu*, 21 September 2010, <http://investmap.pl/wiadomosci/nowy-sacz-rusza-budowa-parku-technologicznego-miasteczko-multimedialne-w-nowym-saczu,17860.html>

I3D, about 60 entities, from small and medium, highly specialized pro-investment businesses to private and public institutions connected with the business community. The cluster combines the working principles of such units as: cluster, science and technology park, research and development center, business incubator and investment fund (venture capital). Its main objective is to create a platform for cooperation of specialists from science and business sectors. The cluster is currently created by about 2000 IT professionals, including the team of I3D.¹⁷ The company, apart from being involved in the works within the cluster, wants to build the ConCave movie theater with a cylindrical screen and three-dimensional projection systems within The Multimedia Town. Construction of the cinema and equipping the halls will be implemented at a later stage of construction of The Multimedia Town

The years 2010-2012 brought another challenge and success for I3D, i.e. the project - **Interactive Engineer Education**¹⁸ - worth 14.1 million zloty, carried out by a team of about 100 people, including employees of I3D and Silesian University of Technology. In the framework of this ambitious and multi-stage project, innovative both at national and European levels, the university halls have been equipped with advanced 3D projection equipment.¹⁹ Among others these are: **stationary set** consisting of a screen for viewing in stethoscope technology necessary to run lectures, advanced computer, projectors and 1000 glasses as well as **portable kits** for conducting exercises, consisting of a laptop, projector and 30 glasses.²⁰ They have also developed new "interactive teaching aids (3D visualizations), (...) which will be used during classes (...) for students of all studies conducted at the Faculty (...). The project was divided into 26 tasks, of which 21 include production of teaching materials in form of interactive 3D models for most of the major subjects of the Faculty (...). The added value of the project will be the use of interactive visualization in classes, during which students watch interactive virtual models and learn about operation of mechanisms, devices and machines, methods of their use, impact of using different materials on their resistance. The major advantage of such classes is that students can observe the operation of an object, note the effects of wrongly matched features of design, material or workmanship and to make changes."²¹ This way of presenting and learning will make students quickly remember and better understand the information provided so far in the form of traditional lectures and drawings.

Effects of work of I3D within the project "Interactive Engineer Education" - sets of interactive 3D visualizations - are currently being analyzed by the scientists of Silesian University of Technology. The first classes with the use of modern teaching aids will be held as early as in the summer semester of 2011.²²

At the beginning of 2011 I3D realized the next project for the Silesian University of Technology - "Delivery of the system for virtual reality projection on a curved screen to assist rehabilitation of the locomotor organ" including construction of a multimedia cave. Silesian University of Technology has acquired EU funds for this purpose from the Operational Programme Innovative Economy and I3D was responsible for providing the cave with the most modern projection equipment and 3D projection and reception of virtual reality. The cave, which aim is to enable to see virtual objects in real scale and to get inside them, is equipped with the best on the market equipment supplied by company Holovis from the UK. Standard equipment of the cave includes: "integrated motion tracking system, surround

¹⁷ Stowarzyszenie Klaster Multimediów i Systemów Informacyjnych (MultiKlaster), <http://multiklaster.pl/?page=1>

¹⁸ Project Interactive Engineer Education is co-financed by the European Union under the European Social Fund, Human Capital Operational Programme 2007-2013 Priority IV. Higher Education and Science, Submeasure 4.1.1 Strengthening the teaching potential of universities. <http://mediamikser.pl/blog/list/index/id/92%2Cfirma-i3d/page/1>

¹⁹ Interaktywne Kształcenie Inżyniera w Politechnice Śląskiej, 14 February 2011, <http://mediamikser.pl/blog/list/index/id/92,firm-i3d/page/1>

²⁰ Wykorzystanie interaktywnych wizualizacji na Politechnice Śląskiej, 18 February 2011, http://wiadomosci.gazeta.pl/Wiadomosci/1,81048,9128086,Wykorzystanie_interaktywnych_wizualizacji_na_Politechnice.html

²¹ i3D w INTEREDU, 4 February 2011, <http://mediamikser.pl/blog/list/index/id/92%2Cfirma-i3d/page/1>

²² Interaktywne kształcenie inżyniera w Politechnice Śląskiej, 14 February 2011, <http://mediamikser.pl/blog/list/index/id/92,firm-i3d/page/1>

*sound system and intuitive wireless devices for navigation in a 3D environment.*²³
The cave created for the purposes of Silesian University of Technology is situated in Technopark of Gliwice in I3D rooms. The cave, among others, will be used by students of the Faculty of Mechanical Engineering, during the classes of virtual reality.

One of the latest undertakings of I3D is participation in New Media Day, held on 23 February 2011 at University of Economics in Katowice. This was an unprecedented event, which involved not only I3D but also the representatives of such companies as IBM, Oracle, Capgemini, ESK Katowice 2016. New Media Day took place within the "1st International Week - Internet Communication Management" during which the representatives of the involved companies conducted lectures in English on topics related to modern technologies and their development. During lectures students had an opportunity to ask questions and comment on the issues discussed on the English account of University of Economics in Katowice on Facebook. The companies involved in the project have funded awards for the most active students. New Media Day is an international event, which *"will reach students from over 20 countries from 4 continents and 12 foreign lecturers from 7 European countries (Romania, Italy, the Netherlands, Germany, Belgium, France, United Kingdom), America (USA) and Asia (China, Taiwan).*"²⁴

It should be also mentioned that I3D is organizing internships for students from Silesian University of Technology and University of Economics. Thanks to the realized internships students can see how application of modern 3D and VR technologies looks like in business practice, have the opportunity to observe the process of creating more complicated presentations and participate in projects implemented by the company.

• Barriers in development.

The main barrier, which I3D had to overcome in Poland, was to **convince potential customers that it is high time for modernity**. *"You need to meet someone who has an open mind, is open to innovation and wants to do something unprecedented"* - says Marcin Wiśniewski from I3D.²⁵ The company is realizing this aim more and more successfully, although, according to Wiśniewski, two or three years ago it was a difficult task. One of the successes in persuading innovative solutions to new customers is the above-mentioned **Interactive Engineer Education** project, conducted by I3D for Silesian University of Technology. In the framework of this project the teaching aids appropriate for future engineers' education program have been developed, though, according to Prof. Bożena Skołud from the Faculty of Mechanical Engineering, the beginning of cooperation was not simple at all: *"We had (...) doubts, many professors, not just professors, me too, were skeptical about this project."*²⁶ However, after delivery of the first sets of interactive teaching aids by I3D (e.g. 3D visualizations)²⁷, the project has quickly gathered many supporters. It is not surprising to Arkadiusz Patryas – Vice-President of the Board of I3D, because, as he says - *"The use of technology known from computer games in education not only makes learning more attractive, but also extends educational opportunities. (...)"*²⁸

Another barrier in cooperation of I3D with the scientific community is the **issue of financing of common** and unfortunately still quite expensive **projects** and activities. Part of the funds necessary to create applications for Polish universities comes from the company, another part from the EU programs and a small part is allocated by universities. Some projects require state funding (e.g. The Multimedia Town in Nowy Sącz - 28 million złoty) or using financial engineering, or simply finding a sponsor. The problem is that universities do not have funds enabling them to carry out independent projects, so they must involve external assets. Waiting for the grants extends considerably the period

²³ The company's own materials provided by Ms Małgorzata Szejka – Assistant of the Board of I3D S.A.

²⁴ Doś P., *New Media Day*, 22 February 2011, <http://www.polsl.pl/lists/aktualnosciczelniiane/pokazwiadomosc.aspx?webparttitle=listawiadomosci&page=1&webparttitle2=wiadomosc&filter1field2=identyfikacja&filter1value2=92>

²⁵ TVP Katowice, 7 February 2011, <http://www.tvp.pl/katowice/informacyjne/aktualnosci/wideo/7-lutego/3925122>

²⁶ TVP Katowice, 7 February 2011, <http://www.tvp.pl/katowice/informacyjne/aktualnosci/wideo/7-lutego/3925122>

²⁷ i3D w INTEREDU, February 2011, <http://www.technika24.pl/i3d-w-interedu/>

²⁸ i3D w INTEREDU, February 2011, <http://www.technika24.pl/i3d-w-interedu/>

of cooperation, which in case of I3D, may also affect the cost and specification of the technology in the framework of the project. Furthermore, because of the lack of available financial resources, limited possibilities to obtain external funds and bureaucratic barriers, interesting and valuable joint projects often have no chance for realization.

There is one more barrier, which should be mentioned: it is a **way of understanding the technology offered by I3D by potential customers**. This is a very important issue, especially when setting expectations and scope of the works that the company has to realize. Today, when technology and possibilities offered by I3D are so advanced, the average person is not able to immediately understand what is meant by the terms used by specialists in I3D, though, according to Jacek Jędrzejowski - President of the company - increasingly popular 3D movies, such as J. Cameron's "Avatar", positively affect understanding of the world created by I3D and its opportunities. Thanks to such movies the concept of virtual reality begins to live in minds of potential customers as a set of specific meanings, reflected in expectations and projects.

• Milestones in the development of cooperation with scientific community.

- Signing a cooperation agreement with Silesian University of Technology (2007).
- Organisation of a symposium together with Silesian University of Technology (2007).
- Creation of Virtual Reality Laboratory at Silesian University of Technology - providing students with equipment and software for watching and creating VR.
- Beginning of realization of "Interactive Engineer Education" project (2010).
- Realization of "Education of the Future" project (2010).
- Construction of the Cave in the framework of the project for Silesian University of Technology (2011).
- Development of research and development programs in the framework of the EU programs (2011).

• Critical moments in the implementation of the idea.

Critical moments, related to activities realized with research centers, regard first of all the above mentioned financial and bureaucratic barriers that appeared at the beginning of cooperation and, unfortunately, continue in its course. Bureaucracy mentioned above, multistage decision making process, delegation of tasks within the university (especially strategic decision-making and approval of subsequent stages of work), transmission of documents, permits, etc., make the first contact of a private company with the academic reality difficult. What takes a moment in a company (decision-making), at a university takes a lot longer and requires many additional and, from the company's point of view, unnecessary documents which delay works. However it should be noted, that the problems arise above the level of project managers i.e. persons appointed by the university for contacts with the company. At this level the cooperation is functioning without obstacles and complications. Full cooperation and commitment is apparent. However at the upper levels of the university's hierarchy the situation is worse due to, among others, not fully established principles of cooperation between universities and business and consequently lack of clearly defined areas of competences of persons involved in the project. This obviously affects the growing bureaucratic requirements, multiplying decision-makers, etc.

However, as seen in the examples of successful projects realized with scientific centers (Silesian University of Technology, Medical University of Silesia and University of Economics), I3D during works on difficult and complicated projects that require cooperation not only with college administration, but also with specialists in different fields ("Interactive Engineer Education" requires cooperation of a hundred-people team including specialists of I3D and Faculty of Mechanical Engineering, while three scientists of Medical University of Silesia were working on virtual exercises of anatomy), has developed an information exchange system which allows, in spite of obstacles, to bring projects to the end. It is based, among others, on close cooperation with academic lecturers, accurate explaining of various stages of works and results obtained, defining common expectations already at the initial stage of a project and anticipate possible requirements of the university by I3D. It is also important to

understand and accept the academic reality, although it seems that contact with business and its growth has a positive impact on the academic structures and the way of realizing common projects.

• Financing sources.

The company was founded on the basis of its founders' own resources. From the beginning they also looked for other sources of financing, among others **EU funds** were concerned (e.g. Measure 8.1 of Operational Programme Innovative Economy), but not all projects could have been financed. Unfortunately, as young entrepreneurs managing the newly formed company, trying to get a loan, "they bounced off the banks' door."²⁹ The founders of the company decided to solve the problem of financing in another way and to look for a **capital investor**. *"After passing through a difficult investment process we managed to acquire the necessary capital from a venture capital fund."*³⁰ Three years ago, when the company Secus Private Equity decided to invest in I3D, this decision was not so obvious – says Marcin Juzoń – President of Secus Private Equity – because the 3D technology was not as well known then as it is now, *"when value of this market in the world is estimated at about 80 billion USD and its very rapid growth is expected to continue."*³¹ Three years ago, the company I3D was at a very early stage of development and guarantee of obtaining revenue from the disseminated 3D technology was not so clear. Moreover it was unknown how the company's development will look like. Today, investors are positively surprised with the results of the company and the pace of its development. However, as President Juzoń emphasizes, the summary of investment in I3D will not be possible before the sale of shares of I3D, assuming that the pace of development will be maintained.³² I3D has already made the first step and, as stated on the company's profile on one of the social networking sites, ***"an agreement with GoAdvisers on the preparation and conduct of a private offer of shares and introduction of the company I3D onto NewConnect market has been signed."*** In connection with plans to introduce the company's shares onto alternative market operated by the Warsaw Stock Exchange, *"on 2 March 2011, the Group transformed its the legal form from limited liability company to joint stock company, thereby changing its name to I3D S.A."*³³ The company intends to debut on NewConnect in the second quarter of 2011.³⁴

Currently I3D uses different available sources of funding. These include its own funds coming from production of software and sale of licenses (30%) as well as delivery of equipment and maintenance of systems used by customers, loans and resources from the strategic investor and also in the near future funds from the sale of the company's shares, because, according to Jacek Jędrzejowski - co-founder of the company - ***"Services offered by our company and demand on the market make our company attractive in terms of investment. We cooperate with the best in our branch - IBM's Deep Computing, Rocky Mountain Supercomputer Center and our customers are the giants such as Boeing, Exxon Mobil and Saudi Aramco."***³⁵

In cooperation with academic community the company is mostly based on its own resources and EU funds, both obtained by the universities and the fundings received by I3D for implementation of specific projects. Thanks to the EU funds it is possible to realize the company's main projects. For example **I3D Science Sp. z o.o.**, whose main objective is to create learning applications, runs the

²⁹ The 1st Congress of Investors and Entrepreneurs, Report from the conference, 2-3 December 2010, <https://www.lowcybiznesu.pl/szkolenia-i-konferencje/relacje-z-wydarze/5-relacje-z-konferencji/50-i-kongres-inwestorow-i-przedsiębiorców.html?showall=1>

³⁰ The 1st Congress of Investors and Entrepreneurs, Report from the conference, 2-3 December 2010, <https://www.lowcybiznesu.pl/szkolenia-i-konferencje/relacje-z-wydarze/5-relacje-z-konferencji/50-i-kongres-inwestorow-i-przedsiębiorców.html?showall=1>

³¹ *i3D idzie po kapitał na giełdę z GoAdvisers*, 20 January 2011, http://www.facebook.com/i3D.VR#!/note.php?note_id=103323566410544&id=131522663561857

³² *Łowcy Biznesu - i3D*, <http://www.youtube.com/watch?v=3jep2K7TZEg>, 2 March 2011

³³ *i3D S.A. – pierwszy krok zrobiony*, 9 March 2011, <http://mediamikser.pl/blog/list/index/id/92,firma-i3d/page/1>

³⁴ *i3D idzie po kapitał na giełdę z GoAdvisers*, 20 January 2011, http://www.facebook.com/i3D.VR#!/note.php?note_id=103323566410544&id=131522663561857

³⁵ *i3D idzie po kapitał na giełdę z GoAdvisers*, 20 January 2011, http://www.facebook.com/i3D.VR#!/note.php?note_id=103323566410544&id=131522663561857

project "Education of the Future" i.e. the development of a set of exercises which simulate physiological processes in animals, for which the company received funding in the framework of the Operational Programme Innovative Economy, Measure 8.1. **I3D Network Sp. z o.o.** implements an innovative project aimed at creating a network of interactive advertising surfaces in the form of interactive TouchWise floors, also financed from the Innovative Economy Operational Programme, Measure 8.1. The assets form the same operational program allowed **LWR Sp. z o.o.** to create the first interactive map promoting cities. Thanks to EU financial support the project is currently in the phase of commercialization. I3D is also awaiting a decision on funding (from the Innovative Economy Operational Programme, Measure 8.1.) the project implemented by the youngest company - **I3D Med Sp. z o.o.** The project's aim is to create **Medical Information Portal** enabling to exchange information among its users.

The example of a project implemented by I3D, based on EU funds obtained by Silesian University of Technology, is the „Interactive Engineer Education” project, worth 14.1 million zloty, co-financed by the European Social Fund, Human Capital Operational Programme 2007-2013 Priority IV Higher Education and Science, Submeasure 4.1.1 Strengthening the teaching potential of universities.

• Benefits of cooperation with the scientific community.

Obvious benefits for the scientific community, resulting from the collaboration with I3D, are an access to new technologies and changing the way of thinking about learning methods and education process. „Interactive Engineer Education” program designed for students of Mechanical Engineering Faculty of Silesian University of Technology in Gliwice opens up many possibilities hitherto unused, says Prof. Bożena Skołud, PhD. Eng. - *"For Silesian University of Technology „Interactive Engineer Education” is a unique opportunity. The project will not only improve the quality of education, but thanks to virtual models our students will better understand and assimilate the knowledge gained. We also believe that such an attractive education program will win recognition among the candidates."*³⁶ These words are confirmed by one of the students who will benefit from the interactive classes: *"We can not wait. The 3D technology is now a novelty, so the crowds will certainly be coming to the classes. Cinema in a classroom instead of paper charts is a really great idea to diversify the classes"* - says Rafał Maćkowski, student of mechatronics.³⁷

Thanks to the project and cooperation with I3D, Silesian University of Technology also gained the most modern lecture hall equipment (described above) and mobile projection sets, enabling full usage of the possibilities of thousand interactive models prepared by I3D in the framework of the project and the education profile at the Faculty of Mechanical Engineering.³⁸ In addition, thanks to common efforts, students benefit from knowledge and experience of specialists of I3D during internships organized by the company.

Cooperation with an innovative company like I3D as well as so far successful projects contribute to broadening the scope of cooperation and looking for new opportunities for joint projects by both parties. An example of a project arising from the previous experiences was creation of an excellent educational tool for Silesian University of Technology - an interactive cave, giving the possibility to carry out practical classes in the framework of the project "Silesian Bio-Farm Centre of Biotechnology, Bioengineering and Bioinformatics".

³⁶ *Interaktywne kształcenie inżyniera w Politechnice Śląskiej*, 14 February 2011, <http://mediamikser.pl/blog/list/index/id/92,firma-i3d/page/1>

³⁷ Warchol M., *Zajęcia na Politechnice Śląskiej będą, jak seans "Avatara"*, 9 March 2011, http://katowice.gazeta.pl/katowice/1,35022,9228932,Zajecia_na_Politechnice_Slaskiej_beda_jak_seans_Avatara.html

³⁸ *Wykorzystanie interaktywnych wizualizacji na Politechnice Śląskiej*, 18 February 2011, http://wiadomosci.gazeta.pl/Wiadomosci/1,81048,9128086,Wykorzystanie_interaktywnych_wizualizacji_na_Politechnice.html

For I3D the cooperation with universities means primarily an access to a database of ideas for new projects and products, opportunities of cooperation with specialists from various fields as well as possibility of contact with students - potential employees of the company or its future customers. It is also an opportunity to implement long-term, ambitious projects, which enable fast increase of the company's know-how and competences. For the company its participation in prestigious projects is also important, because they affect the company's promotion in the scientific community, give experience and help potential customers to imagine ways to adapt virtual reality and 3D technology to their specific needs.

• Plans for the future.

The I3D company, apart from works on authorial software which gives prestige and greater development opportunities, plans to broaden the base of experiences in the field of biological sciences, as well as to develop entirely new presentations, helpful in teaching not only the students of medicine, veterinary and biology, but also students of secondary schools, young practising doctors, specialists and scientists.³⁹ *"In development plans of this type of simulations we create an interactive human atlas which (...) will present how the human body works."*⁴⁰ - says Marcin Juszcak from I3D. Currently the joint undertaking within the project "Education of the Future" is being discussed with Medical University of Silesia.

The company also plans to continue its cooperation with University of Economics in Katowice and Silesian University of Technology, among others in the framework of classes on virtual reality taking place in the virtual cave in Technopark in Gliwice.

1.3. Summary – key factors of success

The key success factors include above all **knowledge, experience, passion, courage and determination of the founders of I3D**. When the company was established, the technology proposed by I3D was practically unknown in Poland, not to mention the examples of its use. The company from the beginning have been using **the latest available software and visualization tools** from companies such as EON Reality, Inc. and IBM Deep Computing (software suppliers) and Microsoft, Christie Digital, NVidia, Philips and Hewlett-Packard (hardware suppliers).⁴¹ Thanks to cooperation with clients such as Boeing and Saudi Aramco, the company has developed its own know-how in the area of construction of elements in Virtual Reality and now is creating its own software, which is reflected in quality of the offered products. The high quality guaranteed by I3D is also a work of **excellent staff of young programmers, designers and graphic designers**, who derived among others from the group of scientists and students of Silesian University of Technology, people who share the same passion as the founders of I3D, able not only to translate the verbalized customers expectations into the language of Virtual Reality, but also get far ahead of their expectations.

The development of the company is also affected by its location in Technopark of Gliwice, where it is known as one of the most active and innovative companies. The **skillful acquisition and diversification of funding sources** was also important. Because the young company did not have a chance to obtain a bank loan, it had to cope in other way. For some projects it managed to win EU funds (e.g. Innovative Economy Operational Programme, Measure 8.1.) while financing other activities and further development of the company required looking for a capital investor. *"After passing through a difficult investment process we managed to acquire the necessary capital from a venture capital*

³⁹ Doświadczenia na wirtualnych zwierzętach i3D, <http://mediamikser.pl/blog/list/index/id/92%2Cfirma-i3d/page/1>

⁴⁰ <http://www.tvp.pl/katowice/informacyjne/aktualnosci/wideo/7-lutego/3925122>

⁴¹ <http://www.technopark.gliwice.pl/index.php?doc=high-tech>

fund."⁴² Currently the fastly growing company is about to take another important step - introduction of the company's shares on the alternative market operated by the Warsaw Stock Exchange.⁴³

The company's success should be also seen in the **previous portfolio of customers and appropriate selection of new ones**, to which the company addresses its services and products, **as well as the ability to convince customers to use the innovative ideas and solutions**. It is very important because the currently available technology goes far beyond the imagination of the average person. When the experts from I3D present possibilities of the offered solutions, customers are able to imagine their use to their own needs. Often the stuff of I3D must overcome the clients' fears of incomprehensible modern technologies, which are being associated rather with SF movies than everyday life of a company or university. I3D shall cooperate with all who are interested in using modern technology. In order to promote and develop the offered tools, the company implements difficult, challenging or simply interesting projects. The company has prepared, among others, for Samsung an innovative advertising design based on Augmented Reality application (mixed reality). Jacek Jędrzejowski – President of the Board of I3D – says: *"The design for Samsung was an innovative activity on the Polish market in the area of marketing. We are satisfied with this cooperation and its effects."*⁴⁴ Additionally the company has prepared a three-dimensional, interactive applications and 3D projection equipment which have made presentation of the rebranding process of the Confederation of Polish Employers more attractive. Skills of the team and technology of I3D have also supported Tauron's debut at the Stock Exchange⁴⁵ and promotion of Silesia in Düsseldorf, where in five spherical pavilions projection of 3D movie took place showing, among others, Industrial Monuments Route and getting down with the virtual elevator to the old mine "Guido". Similar interactive projects were performed by I3D team also at the Expo 2010 Fair in Shanghai and for Zabrze and Rybnik.⁴⁶ I3D has realized a prestigious project for Boeing and prepared a photo-realistic animation of the latest American company's baby - Boeing 787 Dreamliner - perfectly reflecting the space geometry with all its parameters. *"The presentation covers all configurations of economic, first and business classes. Space outline is bit by bit completed with further details, which you can take a close look at and see their functions such as reclining seats."*⁴⁷ The company is also involved in a project of company GreenWave Reality regarding the environment protection, which is based on Flash technology using photo-realistic 3D animation. The project consists *"of extensive and advanced Web site, interactive training of products and three-dimensional movie promoting the project"*⁴⁸, which is an intelligent energy management system addressed to the ordinary citizens and entrepreneurs.⁴⁹

The success of the company was also an effect of **cooperation with Polish and international scientific community**, including Silesian University of Technology in Gliwice, University of Economics in Katowice⁵⁰ and Medical University of Silesia as well as the company's involvement in other activities promoting the VR, AR and 3D technologies, such as participation in conferences and seminars e.g.

⁴² The 1st Congress of Investors and Entrepreneurs, Report from the conference, 2-3 December 2010, <https://www.lowcybiznesu.pl/szkolenia-i-konferencje/relacje-z-wydarze/5-relacje-z-konferencji/50-i-kongres-inwestorow-i-przedsiębiorcow.html?showall=1>

⁴³ *i3D idzie po kapitał na giełdę* z GoAdvisers, 20 January 2011, http://www.facebook.com/i3D.VR#!/note.php?note_id=103323566410544&id=131522663561857

⁴⁴ *i3D dla Samsunga z projektem w technologii Augmented Reality*, 19 July 2010, <http://mediamikser.pl/blog/list/index/id/92%2Cfirma-i3d/page/3>

⁴⁵ *i3D i Alpha Vision zapewniły interaktywne atrakcje na debiucie Tauronu*, 19 July 2010, <http://mediamikser.pl/blog/list/index/id/92%2Cfirma-i3d/page/3>

⁴⁶ *i3D interaktywnie i trójwymiarowo promuje Śląsk w Düsseldorfie*, 19 July 2010, <http://mediamikser.pl/blog/list/index/id/92%2Cfirma-i3d/page/3>

⁴⁷ *Boeing w zasięgu i3D*, 3 August 2010, <http://mediamikser.pl/blog/list/index/id/92%2Cfirma-i3d/page/2>

⁴⁸ *Czy da się prościej? - nowa platforma racjonalnego zarządzania energią, stworzona przez i3D oraz GreenWave Reality Inc.*, 3 August 2010, <http://mediamikser.pl/blog/list/index/id/92%2Cfirma-i3d/page/1>

⁴⁹ *Czy da się prościej? - nowa platforma racjonalnego zarządzania energią, stworzona przez i3D oraz GreenWave Reality Inc.*, 3 August 2010, <http://mediamikser.pl/blog/list/index/id/92%2Cfirma-i3d/page/1>

⁵⁰ *i3D na prestiżowej konferencji Architektów Informacji IA Summit and i3D wizualizuje w trójwymiarze dla Europejskiego Kongresu Gospodarczego 2010 (EEC) w Katowicach*, 19 July 2010, <http://mediamikser.pl/blog/list/index/id/92%2Cfirma-i3d/page/3>

the prestigious conference of Information Architects, IA Summit, gathering the world's top experts in the field of information architecture, the European Economic Congress 2010 (EEC) in Katowice and NewConnect Convention in Wrocław, which main idea is to create a platform for exchange of information and experience between investors and companies on this market.⁵¹ The company's representatives also take part in conferences and meetings not directly related to VR, AR and 3D. These events include the participation of I3D in World Climate Summit in Copenhagen, which resulted in a successful partnership with company GreenWave Reality.⁵²

⁵¹ *i3D na NewConnect Convention 2010 we Wrocławiu*, 3 August 2010, <http://mediamikser.pl/blog/list/index/id/92%2Cfirma-i3d/page/2>

⁵² *Czy da się prościej? - nowa platforma racjonalnego zarządzania energią, stworzona przez i3D oraz GreenWave Reality Inc.*, 3 August 2010, <http://mediamikser.pl/blog/list/index/id/92%2Cfirma-i3d/page/1>