

CREOTECH Sp. z o.o.

The company CREOTECH Sp. z o.o. from Warsaw, Poland is a micro-enterprise based on knowledge and research and managed by three partners. The mission of the company is to create innovative and ready to implement electronic and electromechanical solutions.¹ In order to make optimum use of the market, the business is based on three pillars:

1. developing solutions ordered by other companies and scientific institutions,
2. developing entirely its own products and implementing them on the market,
3. managing production of advanced electronic systems ordered by external companies.²

Creotech was created in early 2008 "as a field of action for the engineers, the best specialists in their fields in order to enable practical application of their knowledge and experience."³ The areas in question are advanced electronics and optoelectronics, particularly design and construction of: **smart digital cameras** intended for strictly scientific applications (e.g. in astronomy) and for monitoring (e.g. traffic-aware smart cameras); **industrial microcomputers based on ARM technology**; **measurement systems** based on the solutions of optoelectronics and embedded computer systems, **"device navigation, acquisition cards and signal processing systems, data transmission systems and other advanced technical equipment."**⁴

Some of the best scientific centers use the services of Creotech, including Polish Academy of Sciences, Institute of Nuclear Studies in Świerk, University of Warsaw and Warsaw University of Technology as well as foreign centers, such as National Institute for Nuclear Physics and High Energy Physics NIKHEF in Amsterdam (Netherlands) or Joint Institute for Nuclear Research in Dubna (Russia) and European Organization for Nuclear Research CERN (Switzerland). The company also cooperates with other Polish high-tech companies creating advanced electronic and mechanical equipment.⁵

The creators of the company are: **Grzegorz Kasprowicz** – acting Chairman of the Board, doctoral student at Warsaw University of Technology, former employee of CERN (European Organization for Nuclear Research in Geneva) and adviser to many Polish high-tech companies; **Paweł Kasprowicz** – acting vice president, also associated with Warsaw University of Technology, mechatronic issues specialist and co-founder of robots in cooperation with the "Mars Society Poland" Program and **Dr. Grzegorz Brona** – Assistant Professor at University of Warsaw, former employee of CERN, adviser in the area of IT solutions implementation, MBA graduate in IT projects management.

The team of Creotech is created by people with great knowledge and experience verified and confirmed during cooperation for the most important technical laboratories in Europe, as well as cognitive and scientific passion. This group of specialists from the best research institutions in the country, through cooperation with many scientific and industrial centers, has gained skills unparalleled in Poland and knows the latest methods of design and manufacturing of electronic devices.⁶ According to the owners of the company, a team of specialists is essential in a business based on the know-how, such as Creotech.

1.2. Sources of success and innovation – technology

Ideas of the company's innovative products and modern technological solutions are the results of cooperation with experts from Polish and foreign research centers as well as challenges undertaken during projects realized together with research institutions. The prototypes of devices created during the cooperation and developed for science became the starting point to create their commercial versions, which are currently used in other fields of science or in different areas of daily life such as monitoring.

¹ <http://www.przeznaukedobiznesu.pl/cms/files/upload/files/Bank-Aplikacji-Biznesowych/Creotech%20Sp.%20z%20o.o.%20Warszawa.pdf>

² The company's own materials passed on by Dr. Grzegorz Brona.

³ <http://www.creotech.pl/>

⁴ <http://www.creotech.pl/>

⁵ <http://www.creotech.pl/>

⁶ <http://www.creotech.pl/>

Innovativeness of Creotech regards two areas: developed projects and organization of work in the company. Innovative projects at the country level concern an industrial minicomputer developed and created by the company, which has no equivalent on our market. Innovation at the international level is related with the most known products of Creotech, such as: highly sensitive camera K20 and its successor K30, dedicated for scientific astronomical research. There are already some highly sensitive cameras on the market, but the product offered by the company from Warsaw "exceeds with its parameters all available devices dedicated for similar applications. In Poland there are no companies specialized in manufacturing similar systems."⁷

Embedded microcomputers systems are certainly innovative in Poland. Another company that provides computers of its own production (designed and manufactured on its own) with similar parameters does not exist in our country. Solutions developed by Creotech differ from the competition. Creotech offers low power consumption, high flexibility and scalability and at the same time - low price. At the moment Creotech must compete with price of a Chinese product while negotiating a supply of one of its microcomputers. Creotech's owners believe that these negotiations will be successful.

Specialized data acquisition cards dedicated for CERN-type scientific laboratories are not produced in any Polish company except Creotech. On the international market there are only a few companies that can deliver products of similar class (reading and processing huge data streams with very high speed and accuracy). All companies that compete with Creotech in this field are large companies employing hundreds of engineers so their costs are much higher and flexibility to adapt to the needs of a specific customer is much lower.

Innovativeness of the company also regards its services unprecedented on the Polish market. These are: designing to order of advanced electronic systems and complex (from design through prototype, production implementation to quality control) electronics production management.

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

Founders of Creotech before creating their own company had no business experience, but had a lot of knowledge and research experience gained, among others, in the Swiss CERN – the mecca of scientists. While abroad, they noted that Polish scientists and engineers are appreciated for their very high level of knowledge and ability to use it in practice. Unfortunately, in the country there were not enough high-tech companies, capable to use this potential appropriately. This observation gave another conclusion - the company employing highly qualified professionals at the very beginning would have a huge advantage on the market. The final decision about foundation of the company was preceded by a thorough, year-long market research, looking for potential clients, working on prototypes of offered devices and checking whether it is possible to implement them within a time and a budget which are finite and attractive to potential buyers. The effect of the market analysis and one year of work exceeded all expectations. The company was not only created, but within the first month of its activity the first cooperation agreement with University of Warsaw was signed.

Thanks to the thorough preparation the beginning entrepreneurs managed to avoid unpleasant situations and unforeseen difficulties, except one - dealing with the Polish law and bureaucracy. According to Dr. Grzegorz Brona *"Polish law is often a difficulty, especially for beginning entrepreneurs who instead developing their new companies are forced to repeatedly submit redundant reports, pay endless visits at the offices and hire an appropriate group of experts and advisers who relieve the entrepreneur. Besides, the Polish law is not adapted to innovative business and officers serving an entrepreneur do not understand such activity. While funding Creotech we had a problem with registration of activities related to computers production - the officers asked for additional explanations regarding our warehouse and production line. It turns out that such concepts as "just in time" production (no need to store items) and outsourcing (in this case outsourced production) are not known to the officers."*⁸

After defeating the last obstacle the company began to implement, in cooperation with University of Warsaw, a large and right away prestigious project (highly sensitive camera K20) and to strengthen

⁷ The company's own materials passed on by Dr. Grzegorz Brona.

⁸ Anna Włodarczyk, *Primum non nocere*, Fundacja Bankowa im. Leopolda Kronenberga, 2009, <http://www.owocebiznesu.pl/wywiady/pokaz/9370/Primum%20non%20nocere>

the contacts created during the initial research of the Polish market. The first year of Creotech's activity was also the year of rapid changes, learning optimization of production, investment in staff and new projects as well as production of small series of specialized measuring equipment.

At the beginning of the company's activity the specialists of Creotech prepared to external orders projects of devices that were actually manufactured in other companies with production facilities. However, after earning a reasonable profit by the company, the shareholders invested in developing their own solutions and products, such as a microcomputer project and smart cameras, which have given the company fame and recognition of the scientific community.⁹

The year 2009 was also important for the company because of the award received in the contest "Innovator of Mazovia" the in the category of "Young Innovative Companies" - "for new products and technologies, especially electronic components of digital cameras, used in astronomical research and lines of devices functioning as computer embedded systems."¹⁰ The company was also awarded with the Gold Medal of Poznan International Fair in the category of "Transfer of research results to business practice" for the camera K20/K30. Moreover on the 25th of June 2009 the company was nominated by the Marshal of Mazovia in the contest for Micro Entrepreneur of the Year organized by the City Handlowy Bank and the Kronenberg Foundation and received the award in the category BEGINNERS.

Subsequent years brought successful entry onto foreign markets (Italy, France, Germany, Switzerland, China and Russia) and implementation of other projects. Currently Creotech cooperates first of all with the scientific community in a broad sense, focused not only on universities but also and perhaps above all - on Polish and European research institutes, i.e.: CERN, National Institute for Nuclear and High Energy Physics NIKHEF in Amsterdam (Netherlands) or Joint Institute for Nuclear Research in Dubna (Russia) and others.

▪ Searching for market niches.

The company quickly found a niche for itself - the market of electronic devices created to order. Although the competition on the electronic devices market is huge, when it comes to measurement, examination or producing signals of single nanoseconds, most contractors do not accept the orders and, if any, set long-term implementation plans and large budgets.¹¹ Grzegorz Brona - one of the founders of the company - says: *"We do things so complicated that it would be difficult for small businesses to copy them. Products are placed in such niches that for big corporations it is not worth to compete with us."*¹² Niches mentioned by Dr. Brona are specialized research devices (e.g. camera for examining the sky or extremely sensitive weather station created to order of physical laboratory of Warsaw University of Technology), which in a short time are modernized from prototype created for study purposes and free of unnecessary equipment and after changing / adding software can serve for more commercial projects (such as smart cameras in marketing research and specialized weather station as one of the equipment elements of so-called smart homes).

Searching for market niches, and thus customers, began even before the establishment of the company. One year was devoted to study the market and demand for projects and products created before the foundation of the company. The scientists-founders had some ideas and believed that with their knowledge, experience and skills of the employees they are able to create new products, which do not exist on the market or better than existing ones, faster and at lower prices. They knew exactly where to submit the offer of the new company. They turned primarily to the scientific community which they knew and secondarily to business.

▪ The first contact of science and business.

⁹ The company's own materials passed on by Dr. Grzegorz Brona.

¹⁰ *NEWCON10T „Innowatorem Mazowska 2009”*, TC nr 8, 24 February 2009, http://tc.ciechanow.pl/aktualnosc-6494-newcon10t_innowatorem_mazowska_2009_.html?print=drukuj&textsize=size_M

¹¹ Dorota Konowrocka, 10 najbardziej innowacyjnych polskich firm IT, EN FACE: Paweł Kasproicz, Computerword Polska, 8 September 2009

¹² <http://www.ip-hub.pl/ip-forum-2009/wypowiedzi/wyberamy-strategie-pierwszenstwa-rynkowego-i-nisz-wktore-nie-oplaca-sie-wchodzic-naszym-konkurentom-153.html>

Founders of Creotech are graduates and lecturers at University of Warsaw and Warsaw University of Technology as well as employees and associates of the Swiss CERN. Therefore it is difficult to talk about the first contact with the scientific community. However, considering the first contact of Creotech as a new company, it took place before the foundation of the company, because the future entrepreneurs, as mentioned above, conducted a thorough investigation of the market and potential demand for their projects. Being constantly related with the Polish scientific community, they knew perfectly its needs and expectations as well as opportunities and perspectives which future cooperation can bring. Therefore they prepared an offer precisely fitting the expectations of potential customers. Dr. Grzegorz Brona, who is well aware of the potential of Polish scientific institutions, says: "*While creating your own business you should count on yourself, but also on academic institutions. We just knew where to apply to immediately sell our products. Other people who plan or develop their start-ups without such connections can count on universities or technology transfer centers, where companies often come with specific demands. One can try to solve the problems reported there. Of course, in Poland it does not work as good as in the West so far, but the cooperation of science and industry is growing.*"¹³ These words were confirmed by the first agreement regarding development of K20 camera signed by Creotech with University of Warsaw in the first month of the company's life, which allowed the company to appear on the Polish research market.

▪ **Development of cooperation.**

Creotech's career started in 2008 with the spectacular success of specialized, highly sensitive camera K20, a project implemented by the company together with Institute of Nuclear Studies of Andrzej Sołtan, Warsaw University of Technology, Polish Academy of Sciences and the seven-people team of employees and doctoral students from Institute of Experimental Physics of Faculty of Physics of University of Warsaw.¹⁴ The camera K20 is designed for astronomical observation and monitoring of a large area of the sky "searching for fast-changing astrophysical processes, in particular optical flares associated with gamma flashes."¹⁵ The camera, the most sensitive camera of this kind in the world, designed, constructed and produced in Poland (except for the lens and CCD sensor), was used in the Polish project "Pi of the Sky", which has been realized since 2004 in Las Campanas Observatory in Chile. With the K20 scientists were able to register the brightest optical flash in the Universe ever seen by the human – the discovery of the birth of a black hole – which was published in the prestigious journal "Nature".

Within the project aimed at creation of the K20 camera, the task of Creotech was to design and organize the production of electronic parts of the cameras. While working on electronics, which in a significant part is a product of Creotech or people closely associated with the company ("design, prototype, optimization of the device, optimization of production, production"), the company was focused primarily on reducing record's noise and interaction of electronics with active thermoelectric cooling of CCD sensor. Attention was paid to the embedded gigabit interface allowing to communicate with the camera and to send pictures via the Internet and the maximum time of trouble-free operation of electronics, because repairing or replacement of the electronics would be very costly and long-lasting due to difficult access to astronomical observatories (mountain peaks, deserts), for which the K20 camera was created.¹⁶

During the works on the K20, the specialists of Creotech have already thought about using cameras in disciplines different than astronomy (biological tests, spectrophotometry, bioluminescence researches) and about commercialization of the idea (like during realization of other scientific research projects) and to use it e.g. in industry (*machine vision*).¹⁷

After the success of the K20, Creotech continued to work on smart cameras. The successor of the K20 is a modernized K30 camera, giving new opportunities (including introduction of a trigger to the camera itself or minimization of data transfer). The project has been developed by the same group of

¹³ <http://www.ip-hub.pl/ip-forum-2009/wypowiedzi/wybijamy-strategie-pierwszenstwa-rynkowego-i-nisz-wktore-nie-oplaca-sie-w-chodzic-naszym-konkurentom-153.html>

¹⁴ Forum Akademiackie, <http://www.forumakad.pl/archiwum/2009/07-08/kronika.html>

¹⁵ Forum Akademiackie, <http://www.forumakad.pl/archiwum/2009/07-08/kronika.html>

¹⁶ The company's own materials passed on by Dr. Grzegorz Brona.

¹⁷ The company's own materials passed on by Dr. Grzegorz Brona.

researchers as the K20. The task of Creotech, besides changes in electronics, was also to create the prototypes – two cameras, which will become the basis of new astronomical observatories.¹⁸

The K20 and K30 cameras and their authors were honored in 2008 with: the distinction at the Fair of Industrial Engineering, Science and Innovation "Technicon-Innovations – 2008", the medal in the Innovation 2008 competition, the Cup of Rector of Gdansk University of Technology for the best technical solution, the diploma of Minister of Science and Higher Education for innovation and in the 2009 – the already mentioned Gold Medal of Poznań International Fair in the category of "Transfer of research results to business practice."

The project of smart cameras K20 and K30 is being continued. The company together with Space Research Centre of Polish Academy of Sciences has applied for funding for research and development works within National Center for Research and Development (NCBiR) and received it in 2011. Thus, works on a camera better than the K20 and K30 will be continued. The company intends to make the final camera one of the most advanced Polish export products.

Smart cameras (a commercial product of Creotech based on the project of the specialized K20 and K30 cameras) became in a short time one of the company's basic products. They differ from ordinary cameras in embedded microcomputer providing the possibility of processing and analysing images directly in the camera. In practice, it means that the camera can be used among others in monitoring objects or guarding persons and property. The camera can detect movements, recognize shapes and inform the user by e-mail, SMS or MMS if any danger is detected.¹⁹

Another commercialized product, directly associated with projects realized by the company in cooperation with scientific institutions and developed while working on the camera K30, is a microcomputer – Armputer, which is a wide field of development for the company (works on a computer based on Renesas processors are pending). The first series of Armputer-type computers was sold to Italy. They are also tested by the company Elproma Electronica Polska – a Polish representative of the Dutch holding company.²⁰

The company has also worked for CERN among others on "the development of FPGA-based acquisition cards for the LHC accelerators complex subsystem control."²¹ Moreover to order of private companies Creotech has prepared a CMOS matrix control system and IR FPA matrix control unit as well as developed the draft and created a prototype of electronics of a laser rangefinder device (for the company Inframet related to Military University of Technology). Furthermore Creotech undertook the development of laser drivers (for the company Eurotek). These are just a few of the works carried out by the specialists team of Creotech.

Business owners also support young scientists, giving them the opportunity to cooperate with the company or to learn through an internship. Creotech is also involved in the project of the Polish Martian Robot Skarabeusz, realized initially by members of Astronautical Student Circle of Warsaw University of Technology and Mars Society Poland. Due to lack of funds and direct financial support of the university, the project has been practically abandoned and its reactivation was possible thanks to Industrial Institute for Automation and Measurements (the main project partner), the sponsor of electronics – the company Transfer Multisort Elektronik as well as Creotech which provided the workshop. With the financial and substantive support, the young engineers managed to build a rover in a record time of three months and get the sixth place in the international competition University Rover Challenge organized by NASA.

Company's cooperation with the customers has been developed from the scientific community in Poland, particularly the company founders' parent universities, and after (in a very short time) the cooperation with European research and scientific centers has been established, i.e. CERN and NIKHEF. Thanks to the successes achieved and confirmed by the awarded prizes and publications in scientific journals, as well as to the recommendations of satisfied customers, the company entered into

¹⁸ Presentation prepared by Dr. G.Brona for the meeting organized by the Marshal Office of Mazovia Voivodeship 10/03/2011 r.

¹⁹ Presentation prepared by Dr. G.Brona for the meeting organized by the Marshal Office of Mazovia Voivodeship 10/03/2011 r. and Dorota Konowrocka, 10 najbardziej innowacyjnych polskich firm IT, EN FACE: Paweł Kasprowicz, Computerword Polska, 8 September 2009.

²⁰ Presentation prepared by Dr. G.Brona for the meeting organized by the Marshal Office of Mazovia Voivodeship 10/03/2011 r.

²¹ The company's own materials passed on by Dr. Grzegorz Brona.

Polish and foreign enterprises. Now the company is working mainly with foreign scientific centers and business, but also does not give up interesting projects with Polish institutions.

• **Barriers in development.**

Since the company's foundation there were no barriers in cooperation between the scientific community and Creotech, because both business owners and employed workers derive from this community and the company's offer is addressed mainly to specialists. One of the most common problems of innovative companies – lack of understanding of the concepts and thus of mutual expectations of the parties in cooperation – did not appear. However in case of Creotech another problem has arisen from the work organization in the company. The company's contractors develop subcontracted projects on the basis of the know-how owned by Creotech. It happens that **the company must reject interesting cooperation offers because of shortage of employees**. The second reason of refusing many cooperation offers from Polish universities and at the same time the problem related with cooperation with Polish scientific centers are their **insufficient financial resources**. A solution could be funds from the EU projects. Unfortunately, those who decide to grant the EU funds do not understand the activities of the company and its real possibilities and potential. Creotech is sometimes classified not as an innovative hardware company, but as an IT company, which prevents it from applying for funding programs, which would be really interesting. So the barrier is **incomprehension of the business profile by people deciding of the allocation of EU funds**, which consequently makes it difficult or even impossible to implement certain projects with Polish research institutions which do not have necessary means. Dr. Grzegorz Brona reminisces about the situation: *"At the beginning of 2009 together with the company GEV and representatives of the medicine world, we offered a software-hardware platform for telemedicine (...). The platform had to be simple, cheap and, most importantly, equipped with maximally simplified operating system, friendly and operated with a single button and in the future also a voice-controlled interface (...). The project was submitted within the Innovative Economy Operational Programme and was rejected at the stage of substantive evaluation. An expert stated that Creotech is primarily an IT company, which also meant that it will not be able to cope with designing the hardware platform, and secondly the predicted company's turnover increase of 300% per year is unprecedented in Polish conditions..."*²²

Milestones in the development of the company.

2007 – research of the market and demand for the company's products;

2008 – foundation of the company by three scientists-associates;

2008 – participation in the Polish project aimed at creation of the highly sensitive K20 camera, then K30, finished with a spectacular success of the device created by the company – recording the birth of a black hole by the K20;

2008-2009 – numerous awards for the projects of the company (e.g. Golden Medal of Poznan International Fair in the category of "Transfer of research results to business practice" for the camera K20/K30 awarded to University of Warsaw and the company) and its owners and the recognition of the company by the scientific community;

2009 – new location of the company - 150 square meters laboratory in Piaseczno;

2009 – including foreign companies and famous research institutes into the group of customers;

2010 – formation of science-industry consortium with Space Research Centre of Polish Academy of Sciences, University of Warsaw and Institute for Nuclear Studies, which is aimed at development of projects in the field of advanced digital cameras;

2010-2011 – receiving funding within the research and development grants of NCBiR;

2010 – reconstruction of the business structure in order to focus more on its own products and less on management of other companies production;

2011 – the first company sales representatives abroad.

• **Critical moments in the implementation of the idea and how they were managed.**

Critical moments regarded primarily the formation of Creotech and regarded bureaucratic formalities necessary to run the company and the requirements regarding the scope of its activities (meeting certain standards, permits, safety certificates, etc.). The founders of Creotech wanted to start their

²² Presentation prepared by Dr. G.Brona for the meeting organized by the Marshal Office of Mazovia Voivodeship 10/03/2011 r.

business as soon as possible and therefore they decided to order the production in external companies having all the permits, consents etc. required by law.

Other critical moments are problems with financing of the implemented projects. In 2008 the newly formed Creotech had no chance for bridge loans offered by banks, necessary while applying for grant within Innovative Economy Operational Programme. The Banks offering bridge loans wanted to talk only with the companies which have been on the market for at least a year. This condition was not fulfilled and therefore at the very beginning of its activity the company unfortunately had to give up some plans.

In addition critical situations regarding directly the implementation of research projects and their subsequent commercialization should be mentioned. They arise among others because works within a project are mostly run by several operators and consequently the components of individual projects are developed in different places. This can cause problems with their integration and prolongation of works. Moreover the division of tasks into several working groups may cause duplication of works or lack of their realization. Problems also arise in the area of projects commercialization regarding different expectations towards the prototype depending on its purpose: scientific or commercial. Creotech, with its big experience in research projects involving many partners, has developed tools preventing the above mentioned problems. First of all, during realization of the project regular working meetings of all partners involved in the project are organized, where next stages of the realized tasks are discussed and their results are presented, particularly compatibility of individual components. Secondly, prior to the work's beginning a detailed schedule (with accuracy up to a week) is developed, discussed and verified during the work meetings. The differences arising from the purpose of the project's result (commercial and scientific) are eliminated by appropriate design of the device allowing exchanging its components, depending on the expectations of the final customer.²³

• **Financing sources.**

Creotech Sp. z o.o., although created by three scientists, has never had any capital relations with universities. The company was created involving private financial resources of its founders, says Paweł Kasprowicz – "*Running this kind of activity does not require high initial capital – the founders' contribution was enough.*"²⁴ The owners assumed a very ambitious plan – 300% turnover increase per year, which they have successfully executed allowing the company to work on the basis of the gained profit. At the same time they looked for other external sources of funding. The entrepreneurs applied for funds among others from the Innovative Economy Operational Programme and other EU projects – with or without success. One of the recent successful projects, submitted by the company together with Space Research Centre of Polish Academy of Sciences in the framework of the recruitment for R&D grants of NCBiR, is the project of continuation of works on highly sensitive cameras, which amounts to 1.5 million zlotys. The project implementation will begin in 2011.

Entrepreneurs have also contacted private investors who, as it turned out, are very interested in a fast growing company. The interest is so great that the owners of Creotech are deciding to transform the business from the company with limited liability into a joint stock company as well as to enter onto NewConnect market in 2012.

• **Benefits of cooperation with scientific community.**

Benefits of Creotech's cooperation with the scientific community in a broad sense are obvious. Thanks to a close cooperation with University of Warsaw, Polish Academy of Sciences, CERN and many other research centers, the team of Creotech has the opportunity to participate in the most advanced research projects, carry out challenging tasks, solve scientific and technical problems and thus fastly widen the know-how of the company. In addition, participation in prestigious projects makes the company famous in Poland and abroad and positively affects the interest of potential clients in its activity. It also enables to establish contacts with the scientific community and the specialists with whom the company may undertake cooperation in the future. Entrepreneurs, supporting research institutions with their knowledge and skills, gain ideas for new projects. They are able to use the

²³ The company's own materials passed on by Dr. Grzegorz Brona.

²⁴ Dorota Konowrocka, 10 najbardziej innowacyjnych polskich firm IT, EN FACE: Paweł Kasprowicz, Computerword Polska, 8 September 2009.

experiences of others and the scientific background of universities. Both parties do not consider it as a competition but as a perfectly complementary cooperation.

Research centers gain a partner with knowledge about the market and its needs, having the possibility to implement the jointly developed technologies, optimize and / or accelerate some technical works, taking charge of a supervision of the project. The company contributes to the development of knowledge and of Polish science making it famous in the world (the K20 camera – recording the birth of a black hole). Moreover it should be noted that the team of Creotech always tries to optimize the costs of their projects without lowering quality, which for not very rich Polish research institutions is very important. For the scientific community it is also important that the contracted projects and tasks are executed quickly. What the competition does in years, Creotech's employees perform in a few months, with much smaller budgets. Good cooperation with the universities also gives the possibility of organization of student internships in Creotech for outstanding students.²⁵

• Plans for the future.

In the near future the Creotech's team will continue to work on the company's main products, i.e. smart cameras, adapting them for commercial use (Intelicam). It will also take part in R&D projects, among others in a project realized together with Space Research Centre of Polish Academy of Sciences regarding highly sensitive smart cameras for purposes of astronomical observatories and for monitoring borders (the project will begin in 2011).

Furthermore, the company will continue to work on other products such as: specialized stepper motors, Polish industrial computer, multichannel measurement cards for use in data acquisition systems, signal converters and control drivers of basin systems and many others.

The company's founders are still expanding the base of potential customers. The company's work and reputation are known not only in Europe. Recently contacts have also been established with scientists in China and Russia, where preliminary discussions regarding new activities have already started.

1.4. Summary – key factors of success

The founders of Creotech indicated the features determining success of the company. They were formulated in 2007, one year before the founding of the company. The founders say that the decision about their own business was the result of profound reflection on the issues listed below.

The founders recommend such a scenario to all those who are serious about starting their own business. It should be noted that young entrepreneurs have a huge knowledge, ambition (the bar is always set high), diligence, wide horizons, a lot of common sense, distance to themselves, their work, expectations towards others and the effects of their work as well as sense of humor. All these elements undoubtedly have an impact on success of a young company. According to the owners of Creotech, in order to have any chance of success the founders of a newly-created company should:

- choose a branch where competition is small for various reasons (a market niche) - for Creotech such a niche were smart cameras and low-noise cameras (and others mentioned above);
- check the demand for the company's products and its business environment, which should be at least sufficient – Creotech's cameras are used in science and their commercial versions in controlling and monitoring;
- be based on realistic financial assumptions and develop realistic plans – Creotech is based on its founders capital without loans or debts;
- put the bar very high – financial plans should be realistic, but ambitious – the owners of Creotech have planned the company's turnover increase of 300% per year and achieved this aim;
- love what they intend to do – very useful in difficult times – Creotech Sp. z o. o. is the result of a longlasting passion of its creators, which was realized through the years by involvement in scientific work or numerous research projects; while creating a team of employees, apart from knowledge and experience, among others they were looking for passion;
- build and maintain a group of professionals in a company – young professionals are working in Creotech, which offers interesting projects and gives the possibility of fast professional development;

²⁵ Presentation prepared by Dr. G.Brona for the meeting organized by the Marshal Office of Mazovia Voivodeship 10/03/2011 r.

- have a great deal of criticism in order to maintain a balance between perfection and reimbursement of the costs incurred – Creotech's development as well as profits and successes achieved by the company suggest that it is possible to keep such a balance.²⁶

²⁶ Presentation prepared by Dr. G.Brona for the meeting organized by the Marshal Office of Mazovia Voivodeship 10/03/2011 r.