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## US SCREENING AND EVALUATION SYSTEM OF INVENTIONS UTILIZED IN HUNGARY

The commercialization of inventions is very complex and challenging therefore it requires the collaboration of several actors in an economy. Even when an invention possesses significant added value, its successful commercialization could only be executed in a stable macroeconomic and innovation environment and also if proper innovation management expertise is provided. ValDeal Innovations Zrt. was established to foster the commercialization of Hungarian, high business potential inventions by providing its business expertise. The company used an – already in various markets and countries probed – US innovation management method consisting of the tasks of technology evaluation as well as the commercialization of inventions. There were major changes necessary while probing the US method residing in the different macroeconomic circumstances and the attitudes for innovation in Hungary. The article details the above mentioned issues together with the conclusions the members of ValDeal have drawn during the innovation management process.

**Keywords:** business potential, commercialization, invention, innovation management, technology evaluation

The level of innovativeness is mostly regarded as one of the most significant factors in determining the development level of an economy. There have been relevant changes in the last several years in innovation management as a result of the increasing amount of information and its availability. Therefore achieving the business success of an invention has become a very complex process (Buzás, 2007a). The first step and one of the most important part in innovation management is the selection of the proper inventions ready for further development. The main reason for that is that an improper project is due to fail even with a background of the most professional business development activity. The filtering process of inventions consists of a competition of the projects in multiple rounds. At each stage of the competition of the projects, the most appropriate ones are selected in order to find the most valuable projects eventually (Terwiesch – Ulrich, 2009).

ValDeal Innovations Zrt. (hereafter referred to as ValDeal) was established in 2006 to foster the commercialization of Hungarian inventions of high busi-

ness potential by providing its business expertise and connections to the Hungarian inventors and by obtaining ample funding for further development of the inventions. ValDeal probed an American innovation management model, which has already been adapted to and tested in various markets outside the US. That model contained the evaluation, development and commercialization of innovative projects. However, the American model had to be aligned with the Hungarian circumstances, e.g. with the specifications of the Hungarian capital market. ValDeal organized contests of innovative projects in 2007 and 2008 with the aim first to screen and then to choose the top quality Hungarian inventions from a market potential point of view. More than 500 inventions were screened and used to probe the US model. ValDeal changed the focus of the original project selection criteria. The main focus in Hungary was on human factors, besides, the Hungarian model also concentrated on the feasibility and the market potential of the projects. The main role of the model was to decrease the risk of investors. Therefore Val-

Deal's managers helped the further development of the technologies and tried to provide additional leverage for future investors by attaching the investment process to grants or regional funding possibilities.

I worked for ValDeal as a project manager partly administering the project selection procedure as well as the business development of some inventions. The article mainly introduces the project selection process of ValDeal by detailing the selection criteria at each stage. The article firstly describes the macroeconomic environment including the description of the need for the activity of ValDeal in Hungary. Secondly, the article introduces the experience and activity of the US organization as well as the professional background and connections of ValDeal; then it details the major changes which had to be executed in order to use the US know-how in Hungary. The core lessons learned are described by three case studies introducing the business development work of ValDeal on two medical and one ICT technologies.

## Description of the problem

First of all let me discuss the reason why a new innovation management model was needed in Hungary; and what kind of void was ment to be filled by ValDeal in 2006. The problem of low-level ability to convert scientific research results into wealth-generating innovations is present in most EU countries, which is called the 'European paradox' i.e. EU countries' weakness is in the ability to convert excellent scientific research results into wealth-generating innovations (Dosi et al., 2006). Focusing mainly on Hungary, while several Science, Technology and Innovation (STI) policy measures were put in place to enforce innovation, still the performance of the National System of Innovation remained weak (Havas – Nyiri, 2007).

The majority of US indicators on global innovation and competitiveness leads the EU-15 members, as well as US well ahead (60% more) of EU-15 members in terms of Venture Capital investments (Atkinson – Andes, 2009). The US is ahead of EU-15 with 30% more new firm formations (Atkinson – Andes, 2011). The rate of enterprises with innovation activity is 31% in Hungary, it is well below the EU-27 level of 52.9 % (Eurostat, 2013). (For more information about the Hungarian entrepreneurship, please read the Global Entrepreneurship Monitor – GEM Hungarian National Reports).

There are several actors in the National Innovation System to create favourable macroenvironment and provide incentives to develop inventions and commer-

cialize new products. The main reasons for the weak innovation performance of Hungary are the unfavourable framework conditions for innovation. "In brief, the macroeconomic environment in 2006 and 2007 is unfavourable for innovation activities of firms: growth is slow, the domestic market is weak, government investment is falling, inflation has been on the rise and net foreign direct investment inflow was small or negative" (Havas – Nyiri, 2007: p. 7.). The innovation performance of Hungary lags behind its possibilities. Several indicators for measuring innovation performance confirm that the level of Hungarian innovation activity is generally low, and innovation based on R&D activity is even weaker. Hungary has a dual economic structure: multinational enterprises with foreign ownership and with an internationally embedded R&D network, and SMEs with low level of productivity and innovation activity (OECD, 2008).

In general terms, in the EU there are very few investment funds of appropriate size to work effectively. The small investment funds specialized for start-up companies do not work effectively, while for big investment funds it is not effective to concentrate on small – and mostly risky – investments. This problem was effectively tackled in the US by the Small Business Investment Company (SBIC) program by providing loans for investment companies. SBIC therefore supports well-functioning seed-funding. The EU cannot catch up with the US in terms of financing by business angels, which is the major source of funding to finance the development and commercialization of early-stage inventions. There is collaboration in the US between business angels and venture capitalists by specific roles assigned to them. Business angels provide funding mostly to early-stage inventions in order to develop them, and make some kind of 'pre-selection' for the venture capitalists, who provide investment for advanced and hence less risky technologies. Thus the risk and cost of financing late stage inventions are decreased in the US (Karsai, 2004). There was a gap in Hungary (and also in the EU) because of the low level of business angel investment and network. The most profound problem was that the projects were not pre-screened for venture capitalists in most cases, and there was also a low-level of pre-selection and seed-funding provided by business angels. That was the main gap ValDeal wanted to fill.

In 2006, when ValDeal was established, one of the significant hindering factors of commercializing research results was the insufficient financing of early-stage technologies. Venture capital invested in Hungary targeted mainly mature companies with low level of

risk. Altogether, in the period of 2000–2005, a yearly average of only 34 investments targeted innovative companies introducing new products or services [Karsai, 2006]. (Karsai in her recent book highlights that the relative amount of venture capital investments compared to GDP sent Hungary down from the 5<sup>th</sup> place of 2006 to the 22<sup>th</sup> in the ranking of European investments in 2010 as a result of the economic crisis (Karsai, 2012].) Additionally, a research was conducted on the readiness and ability of SMEs to attract venture capital, which determined that altogether only 0.25% of the whole Hungarian SME sector is appropriate for venture capital funding (Szerb, 2009). The spread of venture capital investments is hindered in Hungary not just by the lack of SME's knowledge about venture capital, but also by the lack of intermediary organizations providing assistance to match the demand and supply on the capital market and also by the low level of innovation, competitiveness and the inappropriateness of the management of companies intending to involve venture capital into their resources (Karsai, 2012).

Hence, the effect of venture capital investment on innovation was hardly noticeable in Hungary in 2006. The reason for the low-level of investment on early-stage projects is two-fold: on the one hand, venture capitalists mostly regard Hungarian projects offered for investment not mature enough and of a low level of commercialization potential, on the other hand, the project owners complain about the lack of available venture capital. There is a mismatch in the amount required by project owners on the one side, and the amount offered by venture capitalists on the other. Innovators mostly need small amount of investment, while small investments are generally not attracting and not sufficient for investment funds (Karsai, 2004). So there is a specific problem of early-stage projects: there is a gap between the 'demand' and 'supply' of venture capital.

The main problem of commercializing innovations is that there is no real working relationship and collaboration between the Hungarian owners of innovative projects and the investors. There is an underdeveloped business culture because of a low level of collaboration among education, research and business actors and because of the lack of mechanism providing information on the potential markets (Government of Hungary, 2007).

Thus, it is required in the economy to evaluate the market potential of inventions and then manage their innovation processes with professional innovation management knowledge and experience. The financial obstacles of commercialization should be eliminated by decreasing the risk level of innovations and by build-

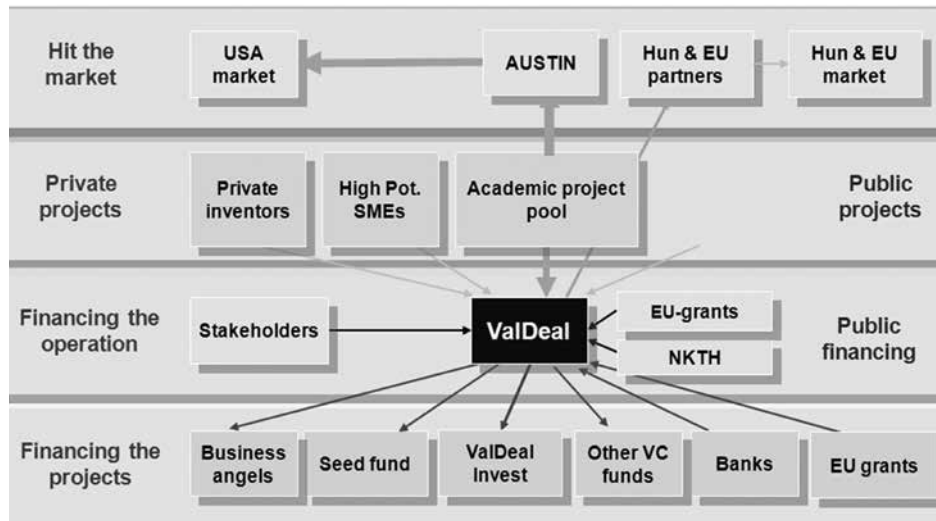
ing a bridge between business angels, venture capitalists and early-stage inventions. The main initiatives to tackle the problem before the establishment of ValDeal – beside the mentioned Hungarian STI policies – were to create intermediary organizations, incubators providing their legal, financial and business development services and physical space for early-stage companies. In the followings, the organization background of the breakthrough model is introduced on the European as well as on US side.

### **The organizational background of the ValDeal program**

ValDeal, as a member of the ISC Group is located close to Budapest, it is in the centre of the Budaörs Industrial and Technology Park (BITEP). The strategic partners, other members of the company group are the Budaörs Property Developer and Service Company (ISC Ltd.) and the Central Hungarian Innovation Centre Nonprofit Ltd. ISC Ltd. acquires new tenants for the Central Hungarian Innovation Centre and it provides infrastructural services for SMEs settled in BITEP. There are already more than 300 companies located in the industrial park employing around 3000 people. Central Hungarian Innovation Centre aims to improve the innovation activity and the competitiveness of the companies with such services as targeting networking, consulting, education and product development.

ValDeal, a member of the ISC Group was established to tackle the problems described above and to deal with innovation management. ValDeal's method of innovation management includes technology and project evaluation as well as determining and executing the commercialization strategy of an invention. The adapted innovation management method consisted of a long screening process with several milestones as a result decreasing the risk of future investors. ValDeal – with the background of the well-functioning infrastructure and network of the ISC Group-offers start-up companies both business incubation and acceleration services including counselling tailored to each individual project. ValDeal has set up a business angel network in order to provide co-financing opportunities for future investors. In sum, ValDeal has provided innovation management services covering all major aspects of commercializing an invention. The chief aim of ValDeal was to develop an innovation management model applicable to Hungarian circumstances and provide innovation management services for the Hungarian innovators as well. The business environment of ValDeal is detailed in Figure 1.

Business Environment of ValDeal



Source: Polgárné, M. I. (2010): From Mind to Market – the story of ValDeal. Presentation at the ValDeal Group onsite evaluation of BIC, Budaörs

The partners of ValDeal in developing the proper methodology of innovation management have been the IC<sup>2</sup> Institute of the University of Texas at Austin (IC<sup>2</sup>) and INNO AG. The latter is located in the Karlsruhe region in Germany. The IC<sup>2</sup> Institute of the University of Texas at Austin (IC<sup>2</sup>) was founded in 1989 with the purpose to identify the most innovative inventions and foster their market introduction. IC<sup>2</sup> currently provides technological development services for more than 140 companies. IC<sup>2</sup> subverses the accumulated knowledge to be utilized as much as possible and spreads the knowledge towards other incubators as well. IC<sup>2</sup> has gained a lot of experience outside the US in the implementation of complex development programs. IC<sup>2</sup> regularly organizes innovation management programs in order to identify the commercially viable technologies, which are also appropriate for being incubated, further developed and introduced to the market. The program of IC<sup>2</sup> was implemented in more than a dozen countries including Poland, Mexico, India, Chile, South Korea, Egypt, Russia, Armenia, Kazakhstan and Malaysia (IC<sup>2</sup>, 2012).

ValDeal has chosen INNO AG as its professional partner principally because of INNO AG's 20 years of experience in innovation management and in commercializing the intellectual properties of public financed research institutes, and in order to involve INNO AG's European experience into the program. INNO AG currently runs complete services of technology transfer and regional development in various German regions thus functioning as a "one-stop-shop" system for com-

Figure 1

mercializing research results. As a result of the collaboration of these institutes and the work of ValDeal, relevant changes were executed on the US methods in order to utilize it in Hungary.

### Adaption by ValDeal: major changes in its innovation management methods compared to the original US methods

In contrast to the US model, the main focus of the innovation management model created by ValDeal was to gain seed financing as soon as possible. Highlighting the differences in the US and

Hungarian innovation systems, one can find that there is a more collaborative approach in the US one. After considering the differences in the macroeconomic as well as in the innovation management environment ValDeal's staff came to the conclusion that the know-how of IC<sup>2</sup> had to be adapted to the region-specific factors. The know-how contained the main elements of project selection, screening and evaluation practices, as well as the practice of business development and incubation which also had to be adapted to Hungarian circumstances.

The model was probed on more than 500 projects in two waves of project collection in 2007 and 2008. Before the adaptation, during the learning-by-doing period, it turned out that major changes were necessary to be made on the model owing to the financial and cultural differences in the Hungarian and US innovation environment. The main points that required modification and the differences between the US and the Hungarian model are summarized in Table 1.

### Modifications in the project selection process

ValDeal initially assumed that the market-centric model of the IC<sup>2</sup> could be used in Hungary without any specific modifications; however, due to the fundamental differences between the US and the European entrepreneurial culture, ValDeal had to modify the project selection method. During the pilot phase, while probing the IC<sup>2</sup>'s method, the most important conclusion ValDeal drew was that the business skills of the project owners were far more important for achieving



Table 1

Comparison of the ValDeal and IC<sup>2</sup> Innovation Management Models

Adaptation issues	IC <sup>2</sup> model	ValDeal model
<b>Project screening</b>	Focuses on the market.	Complex evaluation of the technology, market and people; business skills are highly important.
<b>Access to capital</b>	IC <sup>2</sup> does not put a huge emphasis on creating investable business cases. Capital markets are accessible in the US, financial constraints regarding product development do not create problems or bottlenecks.	The focus is more on early-stage partnerships, licensing and the development of start-ups. The focus is on creating investable business cases, as the capital markets were not well-developed in 2006.
<b>Services required</b>	US inventors/project owners mostly need services in finetuning value proposition, market value, and early-stage business development.	Hungarian projects are developed most efficiently by applying interim management.
<b>Business skills</b>	Inventors have entrepreneurial mindset, and are willing to take risk. Inventors are ready to collaborate with technology managers, therefore training and personal counselling are not necessary in the US model.	Most of the project owners have low level of business skills. They need help and mediation, therefore ValDeal had to implement training about basic business skills and personal counselling.
<b>Cost of services</b>	Inventors are willing to pay for the innovation management services.	Inventors are not willing to pay for the innovation management services.

Source: ValDeal Innovations Zrt. (2012): Innovation management know-how of ValDeal Innovations Zrt.

business success than the scientific excellence or the possible market acceptance of an innovative project. ValDeal's role was to provide its expertise in this field, but the collaboration of the project owners in business development was also required. Therefore, the emphasis of the Hungarian model's project selection process was put rather on the innovators and their experience than on technology. ValDeal changed the importance of the selection criteria but also focused on the feasibility of the technology and its market potential. In order to find the right technologies IC<sup>2</sup> mostly focuses on assessing the market applicability and the market potential. The main element of the IC<sup>2</sup>'s method is to determine the market and commercialisation potential of a given invention by exactly finding its competitive advantages. It is understandable, as the aim of innovation management is mainly determining the commercialization potential and the necessary further development needs of an invention. As ValDeal regarded the personal aspects more important, the project selection process was modified in 2008: a US expert gave a professional written opinion and ValDeal's experts were mostly focusing on personal aspects of the project owner instead of on the business potential of the technology during a personal meeting. In-depth interviews focusing on personality and business skills were executed and then scored in later stages of the selection procedure. By later stages of the selection, the initial selection procedures in order to select the projects with minimum market potential and technological feasibility had already taken place.

### ***Modifications to the different financial markets***

In 2006, entrepreneurs in the US and Hungary had different access to capital. As capital markets were easily accessible in the US, financial constraints regarding product development did not really created problems or bottlenecks. Therefore, the focus and main possibility of innovation management was on creating early-stage partnerships, licensing and developing start-ups. The IC<sup>2</sup> model focuses more on further developing the technology before out-licensing it and does not put a huge emphasis on creating investable business cases, which was required in Hungary. Therefore this part of the model required changes in its focus. The role of the modified innovation management model was therefore to decrease the risk of investments and select the technologies attracting investors as well as create a financing strategy which provides additional leverage for investors (e.g. with grants, regional funding).

### ***Modifications in the services required by the inventors working with ValDeal***

The clients of IC<sup>2</sup> and the Austin Technology Incubator mostly need help in fine-tuning their value proposition, market value and early stage business development. In the case of ValDeal the projects are developed most efficiently by providing interim management for the partner companies. Therefore the adapted model had to be changed accordingly. The ValDeal model incorporates all aspects of company management in order to establish a company and create a product with a possibility of future business success. In contrast, the

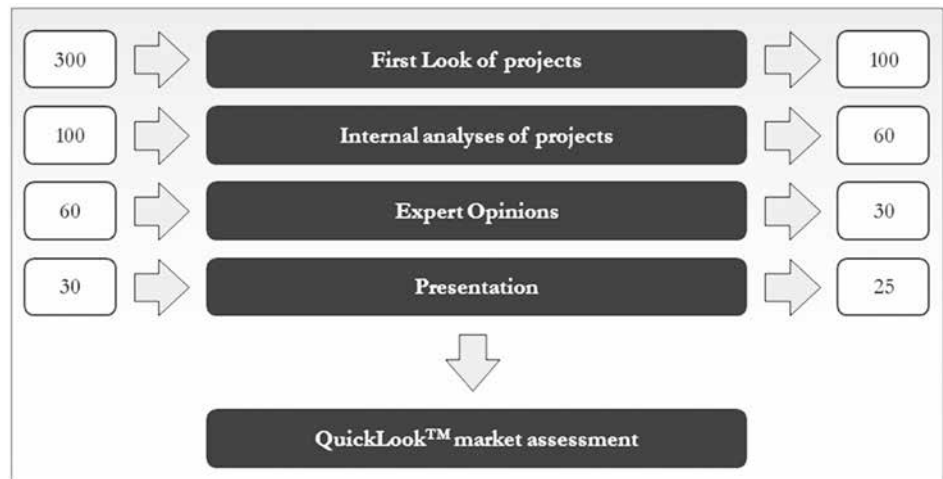
model of IC<sup>2</sup> is more focused on further developing the inventions instead of creating new companies.

There is a huge difference between the US inventors and the Hungarian ones as the US inventors have more entrepreneurial mindset and are more willing to take risk and to cope with technology managers. While most of the project owners or inventors working with ValDeal have never prepared or even read a business plan. It is a challenge for ValDeal to train the inventors to become successful entrepreneurs and to have them understood the strategies and the services offered by ValDeal. Researchers working in academic environment usually find it hard to deal with external innovation managers; therefore they need help and mediation. The entrepreneurial spirit and abilities are completely different in Hungary compared to the US. ValDeal had to teach very basic marketing skills for the inventors, such as presentation techniques, basic knowledge required for company establishment and most importantly how to understand and accept a business-oriented approach or viewpoint.

Finally, it is worth emphasizing that US inventors generally accept that they have to pay for the incubation services. They also understand that, by paying an innovation manager they can increase the chances of the successful commercialisation of their new products or technologies. In contrast, Hungarian project owners are not willing to pay for the innovation management services: in case the external partner only offers knowledge and time, but cannot provide any capital to enable commercialisation, their work will be usually regarded as worthless by the project owners. The inventors working with ValDeal do not have money to take risk and the compensation is principally success fee based which is paid from the investor's or partner's investment or licence fee as a result of the successful work of ValDeal. This affects all tasks of ValDeal's work, as the innovation managers are pressed to execute fast and effective deals even if its subject is not always in alignment with the project owner's expectations. The ValDeal method had to take this compensation mechanism into consideration and adapt the US model in a most effective way to create a stable and sustainable

Figure 2

The project selection process of ValDeal's applied methodology



Source: ValDeal Innovations Zrt. (2012): Innovation management know-how of ValDeal Innovations Zrt.

financial background while providing services required by the Hungarian inventors working with ValDeal.

### The project selection process

The previous paragraph highlighted the major changes on the US model, and now the focus is on one of the most important part, the project selection process of innovation management. As introduced by Terwiesch and Ulrich: "Just as the perfect production of a poorly designed product will lead to commercial failure, so will the perfect development of a bad innovation opportunity" (Terwiesch – Ulrich, 2009: p. 31.). The screening process – introduced in the book published in 2009 in the topic of innovation tournaments – consists of three rounds including web-based voting, innovation workshops and a multiattribute analysis of each opportunity (Terwiesch – Ulrich, 2009). This concept was published later than ValDeal's project was executed, thus its main aspects could not be involved in ValDeal's work. The information given about the evaluators in that book is limited to the employees of a company heading an innovation tournament. Therefore it is important to introduce what an expert in commercializing inventions considers while evaluating the inventions in an early stage of development. The details of ValDeal's project selection process is introduced in this article in the followings step-by-step, highlighting on the main selection criteria.

The project ideas that were being screened were usually in the phase of proof of concept (POC) or working prototype from the medical technology, information technology, engineering or the consumer goods area.

There was a four-step screening methodology applied in the ValDeal model. The methodology of ValDeal had the 300 → 100 → 60 → 30 → 25 reduction steps. There were 100 projects selected in the first round from 300 then with ever stricter screening factors, the final top 25 projects remained for further assessment (*Figure 2*).

The target of *the first selection phase (300 → 100)* was to exclude the projects with obvious lack of business potential. The possible main reasons for the lack of business potential:

- The development level of the project is well below the expected technological or industrial level that would likely attract business partners (e.g. it is only an idea without any technological background and proof).
- The project could not be executed with the existing or expected financial and professional resources anyway.
- The project has no competitive advantages compared to other already existing and available

technologies, which tackle and satisfy the same need of the target market.

The pre-selection process is executed with a simple questionnaire. It is easy to fill in as only 5-10 minutes are enough to answer each point. The questionnaire consists of 8 statements that can be answered simply by Yes or No:

1. The product/service provides clear added value for the user.
2. The product/service is innovative and its novelty is clear.
3. The target market(s) is identified and reachable.
4. The size of the target market(s) is significant and its growing tendency is expected.
5. There is real possibility to commercialize the product/service and the time required to reach this development stage is short.
6. The product/service can be commercialized by an appropriate and feasible business model.
7. The IP background and ownership structure of the invention are clear and confirmed.
8. The barriers of successful market entry are identified and these difficulties can be easily overcome.

Table 2

**Main elements of project evaluation  
in the 100 → 60 project selection phase**

<b>Potential Market Opportunities</b>	Clear problem addressed by technology Products or services enabled by technology Clear benefits Competing Technologies Scientific merit and sustainable advantage Market size, growth, channels, etc. Barriers
<b>Technology Status</b>	Development Status Time to Market Technology roadblocks
<b>Intellectual Properties</b>	Elements of IP Report of disclosures Identification of ownership / ownership rights IP protection Partners
<b>Stakeholder Support</b>	Key Stakeholders Recommended stakeholder support and issues Process champion Commercialization ability of owner Management issues
<b>Resource Requirements</b>	Type of resources required People resources required Financial resources required Potential Partners or licensees
<b>Other</b>	Technology description Response to identified challenges Response to questions

Source: ValDeal Innovation Zrt. (2006): Evaluation sheets of the 100 → 60 project selection phase

The sophisticated way and simpleness of the questionnaire shows how great experience the evaluators have in determining which projects are fit for being selected for the next phase of the selection process. The deep objective evaluation by answering these statements in a Yes/No form is obviously not possible; but it is not a requirement either at this stage. The projects are selected for the second stage of evaluation after the subjective evaluation of experts as well as after the objective evaluation of this short questionnaire.

*The second selection phase (100 → 60)* aims to narrow the range of projects appropriate enough for business development. The duration of the evaluation procedure was about 2 hours per each project. The opportunities and necessary further steps of how to develop and commercialize the projects could be determined based on the desk research and by considering and filling in a 0-3 scale evaluation sheet. This step contained the evaluation of the necessary human and financial resources as well as the business skills of the project owner. The main elements of the 0-3 scale scoring were:

0. *Unacceptable* – Not suitable for commercialization at this time; no problem clearly addressed; insufficient information
1. *Acceptable* – No significant problems or barriers to commercialization identified but NO evidence provided
2. *Good* – No problems or barriers to commercialization identified AND supporting evidence provided

3. *Excellent* – No significant problems or barriers to commercialization identified AND compelling evidence provided

These scores were addressing the following 6 topics, in relation to the commercialization potential (0-3 scale) of the given invention (*Table 2*).

The third phase aimed at evaluating the projects by building on the opinion of acknowledged experts. Evaluating the projects by experts is mostly a very re-

Table 3

### Main elements of project evaluation in the 60 → 30 project selection phase

<b>The Technology</b>	Is it clearly described? Are the benefits clearly described? In your opinion, are the benefits significant enough to support commercialization? Do you see any additional benefits that the inventor did not mention?
<b>Applications and Markets</b>	Does the inventor have a realistic awareness of the applications and markets for the technology? Are the markets realistically identified? Is each market realistically defined and sized? Does each application of the technology offer significantly more VALUE than similar/competing technologies in the market? Has the inventor shown any real market interest for his invention? Do you see any additional applications for this technology? Do you see any additional markets this technology could reach?
<b>Business Model</b>	Is a business model clearly defined? Does the business model make sense? What other type of business model would you recommend?
<b>Competitors and Competing Technologies</b>	Are the competitors and competing technologies realistically identified? Are the strengths of this technology realistic and significant relative to the competition? Can the technology compete within the given structure of the identified markets? Do you feel this technology could compete effectively in the described markets?
<b>Technology Development Status</b>	Is the technology sufficiently developed to an end user / buyer? Is there a technology or product roadmap or plan developed? In your estimation, how much time or work is needed to create a commercially ready product? Have risks been clearly identified that would inhibit commercial product delivery? In your opinion, how likely can these risks be mitigated or overcome?
<b>Intellectual Property (IP)</b>	Is the IP clearly described? Has the IP been patented? If so, where? Is IP ownership clear and unencumbered? In your opinion, can the IP be sufficiently protected to retain its value? Do you see any additional IP possibilities from this technology?
<b>Risks and Barriers</b>	Are the business risks and barriers to success clearly identified? Have realistic solutions been offered to address the risks and barriers? In your opinion, what is the most significant Risk/Barrier and to what degree would it inhibit success? Do you see any additional risks or barriers?
<b>About the Inventor and People</b>	Is the inventor interested and willing to participate in the commercialization of the technology? Does the inventor have a strong enough team or set of collaborators to move the technology forward? In your opinion, does the inventor seem capable of guiding the technology through commercialization?
<b>Your Instinct and “Gut Feel”</b>	If everything is done correctly, can this technology be successful? If everything is done correctly, what impact on the market would this technology have? Who would you recommend the inventor (or ValDeal/IC2) to speak with about commercializing this technology? Any impressions, comments, ideas, concerns about this technology, the inventor or the commercialization process?

Source: ValDeal Innovations Zrt



source demanding process: finding the appropriate expert in the given technology field and the preparation of expert evaluation documents require a lot of time and money. Therefore this step of the evaluation procedure was taken for really promising projects of high business potential. 25 projects of the highest possible business potential were selected in each contest based on the expert opinions and personal intuitions. On the basis of the previously mentioned detailed analyses and expert opinions, all projects got a project evaluation with a detailed description of the further necessary development and modification requirements. The evaluation was based on the main categories listed in Table 3 (Table 3).

*The final project selection phase* included a presentation of the project owners in front of a professional audience consisting of international venture capital and innovation management experts who had the experience to evaluate the projects as well as provide suggestions for the utilization process of the technologies. The project owners present their projects with the help of a preset slide show. The slides were provided by ValDeal in order to get the same information about each project. Each presentation lasted for about 15-20 minutes and consisted of about 10-15 slides followed by brief questions from the jury members. The main elements of a presentation were the added value of the technology, competitive advantages, present development status, business model, description of the target market, market position – competitors, IP status, introduction of project owners and the resource need of the project. The aspects of the negotiations in the final selection phase are the followings:

*Technology:* The evaluators inspect if the technology is backed up with relevant expertise and is elaborated enough in detail. It is also important to check if the technology is ready to target the market and satisfies the needs of the customers. They also estimate if there are any other possibilities to utilize the technology.

*Market and applicability:* The jury evaluates if the market of the invention is clear and there is significant competitive advantage of the technology. The jury always asks if the inventor executed an initial market survey already (if so, what were the results, in which market[s], what is the realistic size of the market[s]). Based on these estimations and analysis the possible latest revenue and the volume of production can be estimated.

*Business model:* It is evaluated if there is a clear business model behind the technology, and which models are suitable for commercialization. It is also evaluated if the competitive advantages of the tech-

nology are strong enough to help successfully commercialize the technology with the possible business model(s) applied later.

*Competitors and competing products:* It is estimated if the competitive advantages of the technology is realistic and provide added value on the long term. The difference between the present technologies, their strengths and weaknesses are also evaluated and compared with the invention.

*Development status:* It is evaluated if the technology is developed enough for commercialization based on realistic (financial, technical) considerations, or if not, can it be developed any further to create a real product/service. In case there is further development needed, the evaluators examine if there are detailed plans already elaborated on developing a product or service from the invention and if the project owner is appropriate to develop the technology further. The length of time and all the efforts, resources that are required are also the target of evaluation. The evaluators identify and assess all the risks and the things to do to overcome those risks.

*Intellectual Property Rights (IPR):* The evaluators check if there is any IPR protection behind the technology, and if so, is its ownership clear and is the mode of protection appropriate for commercialization.

*Risks and obstacles:* The evaluators estimate all the risks of commercialization. They try to visualize how to solve the problems that caused the risk and they try to minimize the risk. Then they estimate the time and cost required to solve those problems and determine if it is worth dealing with those issues and commercialize the products.

*The skills and motivation of the inventor and the project owners:* The evaluators are able to draw the consequences that derive from the skills and motivation of the project representatives during the presentations; and so they can determine if there is any interim management needed to be able to execute commercialization.

After the project selection there was a detailed market assessment prepared for each invention. ValDeal used the elements of the so called 'QuickLook®' report, which is a tool elaborated by the IC<sup>2</sup> Institute. It provides a real overview of the market potential of R&D results, possibilities for commercializing technologies stemming from university, government, public financed research institutes, innovative companies or individual investors. The report was applied to prepare detailed market research for the most promising projects in order to define the market value of the technologies or products. ValDeal also assisted inventors in defining their business model to be followed as well

as in introducing their products to the international market. During the pre-incubation phase of the pilot project some tailored services were offered to the project owners, e.g. the elaboration of business strategies, teasers, licensing dossiers and market studies. As a last step, ValDeal prepared business plans, organized investor presentations and supported investor negotiations to find the best deals for the project owners.

There were lots of lessons learnt during the implementation of the US methods, but the most important one was that the biggest risk laid in the human factor in innovation management. It is absolutely not wise to believe in and work on projects if the human factor is problematic. As a result of the effective and detailed project selection process, ValDeal had effects on increasing the innovation potential of the Hungarian economy.

### The results and effects of ValDeal's work

It is a general practice that at an average of 3-4 projects from 100 business plans read by the investors gain funding, which is also confirmed by AIG New Europe Fund and Fast Ventures (Venture Capital Partners, 2001) investing in 3-4% of the projects possessing a clear business plan. In contrast, ValDeal managed to gain 8 investments, which is more than 10% of all the projects selected into the final stage; additionally, as a result of ValDeal's work, one of the former ValDeal projects, "HIO-Technology" won 20.000 EUR, the first prize of the "Innovation of the Year 2007" in Serbia, and got a huge publicity and support from high level of state administration.

As an indirect effect of the ValDeal program 1 project of the 4 investments of the Portus Buda Group and approximately 13% of the Jeremie I. program investments targeting Hungary was also selected and then participated in the ValDeal program for business development. It should, however, be emphasized, that Portus Buda Group uses a methodology that has been developed at Harvard Business School in order to evaluate the projects before investing.

In addition, one of ValDeal's alumni members has become a co-founder of an innovative financial services company. The business development of that company is partially based on ValDeal's know-how. An Initial Public Offering (IPO) is envisaged to it in 2013. The know-how of ValDeal was taught at the Central European University and the Moholy-Nagy University of Art and Design Budapest. The results of ValDeal's work are being depicted a little more in the followings by some other examples of the business development of inventions.

### Case Studies

#### *Case studies from the 'Medical technologies' category*

A *telemedical device* was developed with the collaboration of a small enterprise and two public financed research institutes between 2004 and 2007. That device was easy to use, considerably automated so that pregnant would-be mothers could do cardiopography (CTG) examinations at home by themselves, completely unassisted by a medical worker. This novelty has created new possibilities in modern baby care by providing an easy way of measurements in the last months of pregnancy by sending messages between the doctor and the pregnant woman through GSM network hence decreasing the time and cost of monitoring of problematic pregnancies. The competitive advantage of the device was clear after testing; as in contrast to the traditional ultrasonic devices the monitoring was executed by passive sensors. There were several medical publications appeared that time about the harmful effects of traditional gynecological ultrasonic devices, which confirmed the significant added value of the invention. The product was ready even to the US market; possessed the appropriate medical tests and the relevant permissions. There was no other significant competitor on the US market, and the strategy for introducing the product was clear by 2008. The experts of ValDeal focused on searching for a partner and quickly contract for a license agreement. At the beginning of 2008, an expert with much experience in the field of prenatal care – one of the ex-managers of Johnson&Johnson – was involved in the process and as a result, negotiations were started among others with the General Electric Healthcare (GE). GE declared at the end of 2008 that they required the proof of business model on the US market for contracting a licence agreement. ValDeal immediately started to make an awareness raising campaign in the US market proving the appropriateness of the business model. In contrast to the Hungarian model of selling the devices for pregnant women, the US model was based on a monthly renting fee. Then, the device could have been rented by companies as members of the partner network providing similar services in this business model.

There was a possible joint venture partner dealing with venture capital investments identified in 2009; which proved itself to be willing to invest in the technology and launch the service with this business model as well as additionally pay for the project owners for the worldwide utilization rights of the technology and

product. The termsheet containing the conditions was signed in 2010, but after 6 months of negotiations the project owners refused to sign the contract.

The conclusion: The project owners did not understand the business model and the conditions of the contract even if it was explained by ValDeal (they trusted their own lawyer who had no experience in the US business language and law). They were afraid that the contract hindered them from utilizing the project with better conditions. They asked for additional guarantees, which were unusual for a venture capitalist, used to the US business culture. Thus the service/product was not utilized later on.

Besides that case, ValDeal had several similar problems as a result of the inventors' mistrust. ValDeal has experienced many times that even if the technology is promising, and there are possibilities and favourable business conditions if the 'human' part of the project is not appropriate, successful business development is hard to be executed. In contrast, if the human factor is favourable, and the project owners are collaborative, the problems with the technology can be solved with an appropriate model for further development. Additionally, commercialization can be achieved and the acceptance of the market can be gained if the project owners agree on an appropriate business strategy leading to business success. That conclusion can be confirmed with another 'medical technology' project, which had a positive ending:

*A technology providing real-time in vivo identification of cancerous tissue during a surgery* was also submitted to ValDeal's project collection and then selected as one of the most promising technologies presented to ValDeal. The technology is a knife, which is attached to a mass spectrometer. The success rate of operations can be improved significantly by using this technology. The invention became one of the winners of ValDeal's project contest in 2007. ValDeal prepared a business plan, assisted in the grant application process and negotiated with a business angel. ValDeal additionally identified R&D partners (Harvard University and Sonic Healthcare, GE), then finally the project gained two investments and the further development of the prototype was launched.

All that success was most probably a straight consequence of the fact that there were no misunderstandings between the project owners and ValDeal's team during the business development process, therefore the project could be managed properly. One should consider that the evaluation, testing and the commercialization of medical devices are part of a long and expensive process as a lot of time is required for

testing, evaluating and licensing these kinds of technologies. The lesson of this project is that in countries where the possibilities to gain seed funding are few, but the local R&D grants are more available; the investments of business angels, venture capitalists can be completed with a grant. In this case the investment provided can be used as an 'own contribution' in order to gain grants. There is an additional leverage with this construction by decreasing the risk of seed financing provided for the investors.

Besides these two cases there is another case study confirming the importance of the 'human factor', and a real need of a bridging institute providing its business expertise from the category 'information technology' described:

### ***Case study of a start-up company investment – Gravity R&D Ltd.***

A group of PhD students attending the Budapest University of Technology and Economics won the competition of ValDeal in the 'information technologies' category in 2008 with their Internet recommendation system which was able to learn the visitors' taste in real time and showed them similar offers to their taste later on. The PhD students realized the need of a manager who was experienced enough in business development in order to attract an investor and achieve business success. Thus they requested and accepted the services of ValDeal. Beside the market entry and business development strategy, ValDeal developed a business plan for them; prepared investor presentations as well as conducted several business development activities in order to gain new partners. The company had real high growth potential; which was convincing for investors.

After all, the preparation before the deal required 6 months from ValDeal, and as a result, two venture capital investments were gained totaled up to 500 million HUF. Additionally, as the start-up company could not find an appropriate CEO for itself with start-up and international experience, a business development manager of ValDeal undertook that role and became the interim manager of the start-up company. By 2012, the company – named Gravity – Rock Solid Recommendations – with its services of the highest quality, personalized recommendations and search solutions employs nearly 50 people at offices in Budapest, San Jose, London and Philadelphia. Their clients and partners are located in 20 different countries including well-reputed multinationals as well as small and medium-sized enterprises.

## Conclusion

The article describes the problem of financing the development and commercialization of early-stage inventions in Hungary and the low level of ability to turn scientific results into innovations. It is also highlighted that as a result of the low-level of the available business angel funding, there is a gap in Hungary in the pre-selection and screening of inventions. That kind of gap does not exist in the United States. ValDeal was established to fill that gap and; screen, select, prepare for funding and eventually commercialize Hungarian inventions of high business potential with the use of an already probed US know-how.

There were several modifications applied in the US method regarding the services provided for the inventors who were willing to work with ValDeal. There was a sensible difference between the US and Hungarian project owners regarding their attitude towards and knowledge about business processes. Thus their service needs were also different. US project owners are far more business oriented than the Hungarian ones, and their projects require only fine-tuning in order to prepare them for investment. Hungarian project owners focus mainly on the scientific excellence of their inventions. Therefore they need more support; that's the reason why innovation management training was provided by ValDeal.

It was clear during the two-round project screening process that the Hungarian project owners require much more preparation work and closer collaboration and coaching; therefore the role of an innovation manager who is working with a Hungarian inventor is broader. For example, to achieve business success, mentoring an innovator and considering the human factor weigh more than the experts of ValDeal has expected before. The know-how has been generated step by step and all elements had to be reused during the implementation process with special attention on the 'human' element. The word 'collaboration' has different meanings for Hungarian and for US inventors; therefore ValDeal had to learn how project owners can be motivated for cooperation. They have different experiences, fears and business competences; so the services (including management, consulting and technological support) were reformed to make them appropriate for the project owners.

There were two project competitions organized in 2007 and 2008 with more than 500 inventions collected. The majority of the projects were not ready for commercialization mostly because of their immature level of technology development and because their market

potential was either not identified or did not even exist. As the Central-Eastern European countries have similar characteristics of their innovation management background and conditions, the Hungarian model could be applied and also further developed in those countries too. Beside the earlier mentioned success stories; ValDeal also provided business development services for the owners of several Hungarian inventions among others in the field of medical technology, information technology and engineering sciences. To date – as a result of ValDeal's contribution – companies assisted by ValDeal have collected more than 1.5 billion HUF (~6.8 million USD) venture capital investment.

The ValDeal project has incorporated the experiences of a learning-by-doing process; but more empirical research is needed to confirm the main results that have been summarized in this paper. This research should be elaborated with a significant number of new inventions collected from the territory of Hungary and be evaluated especially by focusing on the results summarized in this paper in order to verify the current findings. The empirical analysis should be based on a questionnaire in which the business skills and attitude of inventors for collaboration and the utilization of the technologies are analyzed. The comparison of ValDeal's results with the experiences of technology transfer centres located in abroad would also provide significant added value to the analysis of the Hungarian innovation potential.

In sum, it can be preliminarily stated that in order to find the proper way to increase the innovation potential; based on the project findings in Hungary the attitude and knowledge of project owners are among the most important factors in commercializing innovations.

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