

## ICT & COMMERCIALIZATION ASSESSMENT REPORT

*Prepared by*

TECHNOLOGY INNOVATION GROUP, INC.

*for*

"ICT" - A WAY TO IMPROVE THE SKILLS FOR THE YOUNG  
ENTREPRENEURS PROJECT

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# **INITIAL ASSESSMENT INFODEV PHASE 2 PROJECT ROMANIA**

## **INTRODUCTION**

This assessment is the first phase of a two-year project in Romania, the main goal of which is to promote business innovation and private sector development by improving the performance of business incubation activities of the participating incubators. As part of the targeted activities, Technology Innovation Group, Inc. is involved in building institutional, managerial and technical capacity with a view to strengthening services for ICT business start-ups.

With increased exposure to tech transfer practices that have been successful elsewhere and with more training, the incubators and business support center involved in this project should become an even more effective engine for development and innovation among local SMEs. They are to be commended for the success they have already achieved in a difficult environment.

The specific objectives of the project are to:

- Develop programs and mechanisms that foster and encourage the establishment and incubation of start-ups based on Information and Communication Technology (ICT), especially that which has been developed in Romanian universities and research institutions.
- Improve the capabilities of participating incubators to facilitate the development and expansion of ICT-based ventures
- Assist existing and new SMEs in participating incubators to develop and integrate ICT solutions into their operations so they can become more effective and competitive
- Assist companies in the broader population of Romania to share in the benefits that the use of ICT can offer
- Diffuse the use of ICT to new sectors
- Create and improve networks in key areas that support these activities, such as science and technology, entrepreneurship, funding, other incubators, and strategic alliances that can link to other, similar networks in the region and around the globe

The information for this assessment was collected by members of the Technology Innovation Group, Inc. assessment team from June 16-21, and from July 21-25,

2003: Dan Hanson, Dr. Norman Kaderlan, Terry Young, and Deborah Walker. Over this period, they conducted over 35 interviews in five cities, Baia Mare, Bucharest, Miercurea Ciuc, and Sibiu. Interview subjects included staff members of university technology transfer offices, academic generators of technology entrepreneurs, business leaders, key incubator staff, and government officials. A complete list of interviews can be found in Appendix 1. The interview protocol can be found in Appendix 2.

The goal of the assessment was to gain a clearer picture of the existing capacity for technology transfer and commercialization at Romanian universities and institutions with a view to what capacity might be available for incubators to fill. The interviews addressed the general situation facing entrepreneurs in ICT and also focused on the following specific issues:

- Model for the incubators to assist in technology commercialization
- Human resources in Romania to support the program
- Improvements in university technology transfer policies and procedures
- Services to be provided by incubators to support and accelerate commercialization
- Public/private partnerships for commercialization of technology
- How to market ICT for commercialization
- Linkages to other resources in technology transfer and commercialization

The assessment team also reviewed a variety of secondary research, most prominently the "Country Export Potential Profile: Romania – Information Technology," published by the International Trade Centre UNCTAD/WTO (ITC) in March 2002.

The report that follows is in two sections. The first is a qualitative appraisal of the general environment for developing ICT ventures. It looks at the gaps and needs to create the context and environment to foster knowledge-based, growth-oriented companies in Romania. It is followed by an examination of the current context for technology transfer and technology commercialization of research from universities into the marketplace.

Any analysis of the current situation in Romania must first recognize what the country has gone through over the past thirteen years as it abandoned the totalitarian communist regime under which private enterprise had not been allowed and embarked on a painful transformation to a market economy. Such a transition involves more than changing the legal and institutional framework. It also involves changing attitudes, perspectives, norms, values, and traditions; and the direction and pace of the transition is determined at highest political levels, not at the local level. Considering the scope of the transformation needed to develop a thriving market economy, it is not surprising then, that there remain significant challenges to attaining the desired degree of development.

## **THE ENVIRONMENT FOR FOSTERING KNOWLEDGE-BASED BUSINESSES**

The framework for this assessment is an adaptation of a model developed at the IC2 Institute of The University of Texas at Austin. This model posits that several elements must be present to enable the robust development of a regional technology-based economy: technology, talent, know-how, capital, and context and culture.

### **Technology**

The fundamental building block for a technology-based economy is a steady and robust source of inventions that can become the basis of new ventures or new product lines of existing ventures. The technologies can come from universities, research institutions, existing companies, or individuals.

Research and development in ICT in Romania occurs at a sophisticated level. This is based on both analytical and anecdotal information. The comprehensive ITC study of Information Technology in Romania cited the advanced technology as a significant strength of the Romanian ICT industry. That study identified several sectors that were sufficiently strong to serve as a focus for export activities:

- Computer Software Development
- Computing Hardware and Networks
- Telecommunications Equipment
- Telecommunication Carriers and Added Value Service
- Electronics Subcontracting
- Multimedia and Contents Industry
- Electronic Components
- Instrumentation and Diverse Equipment
- Regulation, Control and Power Electronics
- Engineering and Systems Integration Services

Some of this research occurs at universities. For example, our assessment team observed research groups at the Polytechnic University of Bucharest that were collaborating with colleagues at such institutions as California Institute of Technology and Johns Hopkins University, an indication of the high level of quality of their work. We also met with faculty from several other universities who have developed software products for niche markets.

The quality of university-based research is mixed. Interviewees from both university and industry reported a general perception in industry that faculty research is not grounded in realistic needs of companies, and that faculty researchers do not add significant value. However, there is a great desire to improve the quality of research and to make it more relevant to industry. The University in Sibiu is establishing an incubator to promote technology based spin-offs; the University in Craiova is embarking upon an ambitious new technology park that will provide housing and

services for startup companies in addition to facilities for established corporations. And the Polytechnic University of Bucharest is developing plans for an Innovation Center that will assist students and faculty to start their own ventures.

The interviews gave the impression that the level of patenting activity, an indicator of the novelty of the research work and, possibly, the inventor's orientation to commercial applications, is fairly low at the Romanian institutions in the vicinity of the project incubators. For example, the Regional Center for Promotion and Protection of Industrial Property in Maramures County reports only twenty actions per year, almost all of them from individuals, and most of them trademarks, not patents.

Several factors contribute to this low level of activity. First, the costs of obtaining intellectual property (IP) protection are relatively high and beyond the means of most institutions and start-up ventures. There is a degree of skepticism about the effectiveness of the protection. Most universities we talked with do not have a great deal of funds or provide services to support the application for IP protection. Finally, it is not clear that faculty really understand the benefits of such protection or how to go about obtaining it.

This situation is not so different from other Central and Eastern European countries such as Poland and the Czech Republic where members of the TIG assessment team observed that university faculty have a similar lack of orientation toward industry and commercial applications of their work, and where patent protection is minimal.

## **Talent**

A second requirement for a technology-based economy is talent, a source of individuals trained in science and technology who can take the technology from the laboratory to the marketplace.

One issue on which there was consensus is that Romanian universities do a good job of training scientists and engineers. This is especially true for software engineers and developers. In the software area particularly, interviewees from across the board agreed that graduates have a strong work ethic, a deep culture, and are oriented toward innovation. Evidence cited for this includes the fact that "Romania has the most skillful computer hackers" and the high level of achievement of Romanian teams in international competitions for mathematics and programming.

Romania has lost many scientists and technical workers over the past decade to the US, Canada, and Europe. The rate of emigration has slowed recently, however, due to the economic downturns in these countries. Consequently, young Romanians with these skill sets are looking for more opportunities within their country.

One consequence of the emigration of talent is that Romanian companies have higher costs to compete for that talent. To achieve competitiveness in a global environment will require companies to adopt a more global perspective.

It is quite difficult for Romanian (or other) companies to entice engineers, scientists to move from one Romanian community to another; they will much more readily emigrate than move within the country. As a result, internal mobility is highly constrained and it becomes more difficult to attract local talent within the country. From our interviews, it seems that this reluctance to relocate is caused by the high costs of replacing an individual's existing support structure in his or her hometown with an equivalent network in the new community. It also may be that they do not perceive an opportunity for significantly changing their situation with an internal move. People are willing risk more through emigration because they perceive the opportunities and payoff for the move to be greater. Constrained mobility is not unique to Romania; this situation is common in other eastern European countries. Members of the assessment team encountered similar circumstances in Poland.

As discussed in the next section, Romanian scientists and engineers generally lack an awareness, understanding, and orientation toward business. The ability to translate of scientific and technical discoveries into new products and services is missing throughout the Romanian economy. This lack of business perspective is not surprising; it is characteristic of scientists and engineers around the world. However the situation in Romania poses a substantial challenge, as we shall see.

## **Know-How**

A third requirement is know-how—a pool of experienced entrepreneurs who can form the core of the management team of the new ventures. Also important are experienced entrepreneurs to act as advisors and mentors, and a range of capable and experienced service providers who can offer support and expertise in law, accounting, finance, marketing, etc.

In developing a vibrant knowledge-based economy in Romania, a key strategy is the development of the conditions that will lead to the creation of locally based technology companies. One prerequisite for such a strategy to succeed is a group of trained entrepreneurs who can grow and build businesses.

Such a strategy includes key elements: a pool of experienced entrepreneurs who can successfully create and grow new ventures; training programs to develop local entrepreneurial talent; and support networks that can assist entrepreneurs and entrepreneurial ventures.

There was strong sentiment on the part of those interviewed that Romania lacks a group of trained and experienced entrepreneurs who can provide the entrepreneurial leadership for a new generation of ventures. This view was present across the board in the locations where we conducted interviews.

This paucity of entrepreneurial talent is caused by both a lack of effective programs to train entrepreneurs, and a lack of successful entrepreneurs who can serve as role models for the new generation. Currently, there are a number of entrepreneurial training programs, most notably at ASEBUSS (MBA with a specialty in Entrepreneurship, and short courses), at the Center for Business Excellence at the Polytechnic University of Bucharest, and at several business incubators, especially those that are partners in this project. Additionally, a number of universities now offer majors in "Economics" that include entrepreneurship courses. There was a sense on the part of those interviewed that although these programs were valuable, more needs to be done.

There appears to be only a handful of business successes thus far for new entrepreneurs to learn from and adopt new practices. One of the most talked-about is GeCad, which recently sold its anti-virus software product to Microsoft. The founders' interest in giving back to their community in Romania is an indication of a new interest and nascent culture among existing entrepreneurs to assist others where possible.

The existence of such role models is crucial to the development of the next generation of entrepreneurs. Currently, despite occasional efforts by the government to support new venture creation, the number of companies started by young people is extremely low: in Maramures County, fewer than 1% of startups were founded by entrepreneurs under 30.

ICT companies face major market inefficiencies, most significantly access to capital and to markets—local, national and international. It was clear from interviews spanning the western part of Romania through to the capital in the southern part of the country, that both regional and national markets were not efficiently matching excellent locally generated ICT products with customers beyond the region where the products were developed. It also was clear that the developers and marketers of the products did not always set their sights on larger national or international markets. This narrow view of the market is not exclusive to Romanian ICT managers, however; it also is characteristic of underdeveloped and lesser developed economies, both in central and eastern Europe and in Latin America.

In a country with such severe market inefficiencies, opportunities cannot be matched efficiently with resources. This is one of the most significant obstacles confronting the development of more start-ups, for any sector. Founding new ICT companies depends, in part, on would-be entrepreneurs seeing opportunities in the marketplace, evaluating the risks associated with starting a new enterprise, and finding the path to sufficient resources to exploit the opportunity. An inefficient marketplace does not have all the necessary linkages to facilitate investment, commercial exploitation and global market access development for new ICT technologies.

There are several sources of support and assistance for entrepreneurs and entrepreneurial ventures. Some universities either currently provide or have plans to provide such services to aspiring entrepreneurs from their ranks. This includes the Universities in Sibiu and Craiova, and the Polytechnic University of Bucharest (PUB). PUB also supports the Center for Business Excellence, which provides training in a variety of related areas to entrepreneurs and their ventures. Another important source is business incubators such as the partners in this program, BIC Baia Mare and the incubator in Miercurea Ciuc. Often these are the sole source of entrepreneurial assistance in smaller communities.

One of the significant challenges facing these incubators is the need to develop reliable revenue streams. The incubator in Baia Mare is typical, in that almost 70% of its income comes from grants for the administration of programs, with only about 30% of its income coming from service fees.

Development of a thriving knowledge-based economy takes place in a global context. The existence of modern computer and communication technology enables resources to link with other resources and regions to link with other regions around the world. Such linkages will allow Romania to leverage its strengths and to access resources that may not be available locally. They also will enable Romania to become a hub for regional development.

In our interviews, we asked about existing networks in key areas: technology and research; entrepreneurial support and mentorship; strategic alliances; regional networks; and existing mechanisms to create and foster regional and global linkages.

What we found was that Romania has excellent technical talent and industrious persons who are willing to start new ventures. However, they are left to rely on their own social networks in their immediate community to find the path to creating a new business. This is also one of the problems in getting more business transacted across regions—the entrepreneurs don't have much of a network in other communities, thus feel constrained from developing business elsewhere.

It becomes obvious then, that a major goal to be achieved in improving the efficiencies of the marketplace for would-be ICT entrepreneurs is the creation of linkages—domestic and international. This is a key area for the current business incubator project participants to develop and is an area that will receive considerable attention throughout the course of the project. These linkages will include: 1) facilitation of capital; 2) improving market access points domestically; 3) introducing international market access points; 4) becoming familiar with the process of getting new ICT technologies transferred to the marketplace and 5) connecting internationally with other incubator organizations that focus on ICT start-up facilitation.

## Capital

A third requirement is capital, a stable and sufficient source of funding that will support and nurture the new venture from pre-startup activities through launch and expansion.

The lack of early stage company financing is the most critical element missing for the development of a technology-based economy in Romania. Most new businesses that plan to sell technology products require some investment to finance operating expenses for the time between when a company is organized to when it produces an excess of revenues above expenses. For ICT companies, this period can last a few months to several years.

The sources that do exist are not appropriate for start-up technology firms. Several organizations and agencies provide micro loans, but they either are too expensive or too limited for IT companies with ambition. Existing government loan programs have onerous requirements—most companies do not have the assets to put up necessary collateral.

At each stage of a company's development, there typically is a different set of capital providers. At the beginning stage of a company, an entrepreneur will often contribute his or her own funds to create a prototype or proof of concept of a product. The entrepreneur will use savings and credit to finance these early activities leading to the formation of a company.

The next stage involves recruiting friends and family members to contribute capital to further develop the product, secure equipment and facilities, and the creation of the legal documentation necessary to form the company.

On an absolute basis, this source of funding is limited within Romania. However, on a relative basis this funding could be the most ubiquitous. Due to relatively low costs in Romania, companies do not need a lot of money to be formed. But while many new ventures could find enough money to be initiated, they are starved for additional funding for any activities beyond the creation of the company.

In developed countries, "angel" investors often provide additional capital to grow a company after it is created. This set of capital providers is composed of wealthy individuals who invest in promising companies on an informal basis, and they represent the first source of funding by "outsiders" to the company. Angel investors seek a high return for their investment, but professional investing is usually not their business. Often angel investors have done well financially in a specific industry, and they choose to invest in companies operating in these same industries that the investors know well. Another motivation by some angel investors is the desire to assist entrepreneurs in their home region or community.

There is very little evidence of angel investment activity in Romania. However, discussions with successful entrepreneurs, business executives, and government

officials indicated an interest in recruiting Romanians from within and outside the country to invest in domestic companies. This would be a key development, since the experience in developed countries suggests that angel investors provide several multiples of the amounts of risk capital compared with venture capital firms. Furthermore, venture capital firms typically do not invest in companies that are still in their infancy, especially in countries that do not yet have an established record of entrepreneurial success.

Another level up in funding sources for companies, especially those in developing countries, is the ability to attract loans and grants from non-governmental, or non-profit, organizations (NGOs). These organizations operate as businesses but have the additional mission of supporting economic development. NGOs can be domestic or international, and they help fill the gap between early stage capital and professional investors.

In Romania, there are a few NGOs devoted to providing capital and entrepreneurial support for small and medium sized businesses. One of these interviewed is CHF International. This NGO recently was awarded several million US to provide loanable funds to small businesses in Romania. These businesses have to meet several criteria for eligibility, but these criteria are not onerous. Loans will be made for up to \$25,000 and the business must provide monthly reports on its financial operating performance. As the CHF's loan portfolio grows, the repaid principal will be recycled as new loans, thus enlarging the capital available for small businesses.

Another NGO operating in Romania is a creation of Shell Oil Company. This organization is ChiarPoti and has a mission to support small business development in Romania, with a special focus on rural areas. ChiarPoti works closely with foundations and other NGOs to assist in economic development efforts.

As companies mature and become profitable, they become more attractive as potential customers to banks. Banks seek out successful companies at this stage of growth because they can contract for a variety of financial services. For example, companies need cash management and short-term investment services, liquidity vehicles, loanable funds, and investment banking services. Larger banks offer all these services and also provide introductions to credible service providers and sources of equity capital.

There are a few domestic banks in Romania, and there are several large international banks operating in Bucharest and other large cities. Several programs by NGOs, such as the European Bank for Reconstruction and Development (EBRD) have provided grants to banks to bolster their equity and enhance their capacity in their loan portfolio. There is very little evidence, however, of banks providing risk (equity) capital to small businesses.

Merger and acquisition financing is the next level up for larger, profitable companies. Capital for these activities can be a combination of equity and debt, or a combination of the two. These funds are typically raised with the assistance of

investment bankers who operate domestically or internationally. For companies ready to be acquired by, or themselves acquire, other companies, there appears to be sufficient access to the required capital. GeCAD, a software development company located in Bucharest, recently sold its antivirus software to Microsoft in a partial acquisition for US\$10 million. This transaction highlighted the growing availability of Romanian companies to engage in merger/acquisition financings.

Finally, companies mature enough to seek equity funds through the publicly traded stock markets may issue shares through an Initial Public Offering (IPO). Romania has an established and well performing stock market due to several favorable conditions. Although Romania was one of the last eastern European countries to shed its communist form of government, the country's stock market has outperformed its peers in the past three years. Romania's foreign debt is extremely low at just over 30 percent of GDP, primarily as a result of the fact that Romania did not borrow during the Soviet era. This low debt level is often cited as one of the principal reasons the European Union is providing more private funding to the country.

In addition, a depreciation trend for the Romanian currency (lei) and responsible macroeconomic policies are increasing the prospect for further investment from the European Union and other developed countries. Finally, inclusion of Romania in NATO (May 2004) and possibly the European Union would significantly enhance the ability of the country to attract foreign investment into publicly traded companies.

One final issue about company growth and investment capital is worth noting. As a company grows and matures, a seamless transition from one source of capital to the next is critical to its success. Fractured and uncoordinated pools of capital can severely undermine small businesses and inhibit growth. Therefore, efforts by the Romanian government and major NGOs should focus on supporting the financial infrastructure for businesses of all sizes.

## **Culture and Context**

The final requirement for the development of a technology-based economy is the existence of the conditions and culture that encourage entrepreneurship. These include societal values and norms, and legal, financial, and regulatory systems that foster and encourage entrepreneurship.

It is in this area that Romania has some major challenges. The transitions from a command economy to a free market economy, and from an industrial economy to a new, knowledge-based economy with global competitors has been painful. Unfettered entrepreneurship is still a rare commodity; however, there are pockets of activity around the country. And though the older generation is wary of change, the younger generation are far more accepting of it and willing to take risks.

Risk taking is yet to be the norm. Romanians tend to act only when legislation specifically permits them to do so, whereas in the U.S. and elsewhere in the West,

entrepreneurs take actions as long as they are not specifically prohibited from those actions.

New companies face a daunting array of challenges: At the policy level, there is a wariness of entrepreneurship; tax and regulatory policies are highly volatile; the bureaucracy is slow, ineffective, and onerous; and the legal system is inconsistent and inefficient; corruption at the local governmental level is rampant; and businesses are subject to an incredible number and variety of taxes.

And yet...people still start businesses in spite of these obstacles. That in itself is an indication that the entrepreneurial spirit is present and just needs nurturing to flower.

## **TECHNOLOGY COMMERCIALIZATION**

One of the primary focuses our interviews was the current state of technology transfer and technology commercialization activities in the IT sector at Romanian universities. This is important to our project because inventions at universities could become an important element in the establishment of new, locally grown ventures, and the foundation for the development of a technology based economy.

Universities are a primary source of new knowledge and innovation. Experience of the past twenty years in the United States, Western Europe, Australia and Japan has demonstrated that this innovation can be transferred to commercial application while maintaining the traditional academic missions of education, research and service.

Transfer of academic innovation to commercial products is managed by some form of Technology Transfer Office (TTO), which usually serves the faculty and administration of one institution in the protection of research results and the transfer of resulting intellectual property to industry. TTOs can be set up in a variety of ways and can serve the interests of more than one institute or university. TTOs provide significant benefits to their institutions and community:

- Enhancement of faculty recruitment, reward and retention
- Development of closer linkages between academia and industry
- Direct impact upon local, regional and national economic development through creation of new companies and new product opportunities for existing companies
- Creation of new products in the market that benefit the public (that would not exist but for the TTO processes)
- Generation of new sources of income and innovation for research and education

As a service unit, the TTO creates no intellectual property on its own. Rather, it facilitates the identification, protection, marketing, and transfer of the intellectual property created by researchers to commercial partners.

To be effective, a successful TTO requires a skilled and trained staff and sufficient funding to a service level commensurate with the volume of institutional research that creates new and innovative technologies that can be commercialized. If the university or research institute is to retain the ownership of the IP rights, those funds must be sufficient to cover costs of international patent protection, not just protection in Romania. There did not seem to be an adequate appreciation of this cost. It is unfortunate, from our perspective, that more attention seems to be paid to funding real estate ventures (numerous "science and technology parks are underway or planned" with funding on credit basis) for the various universities than to the effectively managing the commercialization of the IP generated in those universities.

## **TOP 10 BARRIERS TO TECHNOLOGY TRANSFER and SME START-UPS**

Much public action, both at the governmental or institutional level, is still needed to provide incentives to transform the academically generated knowledge into new products. We found the following to be obstacles to effective technology commercialization generally and to having a flourishing environment for ICT start-up companies specifically:

1. **Tax and fiscal administrative system facing businesses.** This is one of the most antiquated in the region and hinders businesses from starting or being operated in a fiscally responsible way. Overall legal framework conditions, such as a fair and well-functioning tax system, alleviated bureaucracy, improvements to labor/employment regulations, etc. must be put in place to spawn the creation of new SMEs and to provide incentives for existing firms to upgrade and invest in research and development. We do understand major fiscal reforms are planned but cannot evaluate whether the outcome will be a major improvement.
2. **Legal Infrastructure.** Though progress is being made, the legal infrastructure is not yet developed well enough to be supportive or conducive to technology transfer or management of intellectual property rights—the "rule of law" essential to effective technology transfer and inducement of investment from the private sector. This also applies to the lack of clear policies and procedures at the institutional level where research is generated. Without clear rules on ownership of IP and policies, private investment in academically generated IP will continue to lag.
3. **Banking Infrastructure.** This currently does not support development of SMEs. We saw no demonstrated understanding of key issues relating to technology commercialization such as technology transfer, the needs of high technology businesses, etc.
4. **State Support for Research & Development.** The impression from the interviews is that the current level of governmental support for research is not

sufficient enough to support commercialization of technology developed at Romanian institutions. However, we were impressed with the recognition at the national level that more needs to be done in this area to commercially exploit the fine human capital that Romania has.

5. **Protocols, People and Programs (infrastructure) to Support Technology Transfer.** Few processes or protocols exist in public, academic or private sectors for technology transfer. Policies that establish clear ownership of intellectual property are inadequate or nonexistent. There is no recognition of or funding for adequate (international) protection of intellectual property. The concept of technology transfer that exists in institutions is not consistent with international best practices. Additionally, practically no skilled or experienced technology transfer professionals or offices are available to make possible the effective transfer of technology.
6. **University Curricula and Mentality.** Academic curricula are slow to respond to the real and current technology needs of society or relevance to the real world of technology commercialization . We saw no attempts being made to cross disciplines in this field, that is to get engineers in the same course with business students, with law students, and with other science students to approach the common subject of commercializing technology. It is recognized that the lack of multi-disciplinary universities in Romania presents challenges for organizing such courses, but this should not remain an obstacle.
7. **Poor Relationship Between Industry and Higher Education.** Industry typically does not believe or perceive that academics have solutions to their business and technical challenges. Communication between industry and academia is totally ineffective.
8. **"Brain-drain."** Many of the best and brightest students and technically trained individuals continue to leave the country to take more lucrative jobs abroad.
9. **Lack of Entrepreneurial Mentality.** Too few entrepreneurs remain to establish innovative SMEs or to champion technology transfer. Indeed, the environment tends to discourage risk taking and thus diminishes the incentives for acting in an entrepreneurial manner.
10. **Practically no early stage Venture Capital or Any Other Means of Risk Financing for SMEs.** The lifeblood of new ventures is early stage investment, and this source of funding is extremely scarce in Romania today. It might serve Romania well to approach its diasporas living in the US, UK and Germany, for example, to become possible angel investors to augment the few that are within the country.

## **SUMMARY: MOVING TOWARD MORE EFFECTIVE TECH TRANSFER**

One of the encouraging signs that Romania is taking steps toward improving its capabilities in tech transfer is reflected in the Ministry of Education and Research's National Innovation Strategy. (See Appendix 3.) Many of the actions and first steps needed to improve conditions for tech transfer and, thereby for technology start-up companies, are described in the Strategy document. These initiatives should make it easier for the academic institutions generating IP to take steps, individually or collectively, to improve the mechanisms and processes for technology transfer.

Other requirements for successful technology transfer are institutional policies, regulations and protocols that enable the processes of intellectual property protection and transfer to industry through formal agreement. Such institutional policies and regulations for technology transfer must be consistent with the nation's legal system, and its laws addressing intellectual property, contracts, business creation, and the like.

Quite apart from the "systemic" features needed to be in place for institutions to effectively transfer technology, there is also the aspect of "culture." An academic culture that supports and appreciates the value of technology transfer is important for faculty participation in the process. Various incentives might encourage faculty to participate in the process of commercializing their inventions. One such incentive is royalty sharing that returns a portion of eventual revenues back not only to the university generally but to the faculty member's academic department ("faculty") to enhance funds available for further research, and to the faculty member himself or herself who developed the innovation.

As more competitive forces come into play in Romania, scarce research and development funds should be allocated according to clearly defined, objective criteria. If, for example, faculty members knew that the one factor in allocating research funding was the amount of royalties their department generated as a return on investment of research funds, their interest in and appreciation for technology transfer might be increased.

We found several universities and public research institutions in Romania producing high-quality scientific and technological knowledge that could become the basis for new ventures or new product lines in existing businesses. We also found that the process infrastructure that supports such activities is highly inadequate.

In order to accelerate knowledge-based economic development there must be mechanisms that encourage and facilitate the protection of IP, that encourage the transfer of scientific and technological knowledge across institutional boundaries, and that provide incentives to both those who create the knowledge and those who will invest in bringing that knowledge to market. This requires highly trained individuals managing those mechanisms, once established. Such skills that are needed in this respect are not present at this time in Romania. Even many highly industrialized countries recognize that these skills in TTO management are lacking

and send their managerial candidates to train at institutes outside their country whose TTO management they admire. This would suggest the necessity for developing programs to train people in technology commercialization and internships with existing university technology transfer offices in Western Europe or the United States.

We cannot emphasize enough the need for further exposure to obtaining hands-on technology commercialization practices internationally. While it is a good sign that many persons around the country were speaking of the need to improve technology commercialization, we found the prevailing concept of technology transfer to be basic and limited. Much value is being given away to many foreign research partners or companies who are able to take advantage of unequal bargaining power in the relations. The primary focus for technology transfer efforts at Romanian universities tended to be narrowly focused on obtaining contract research or service contracts for their faculty. We did not see evidence that any institution has a full service technology transfer office that even comes close to conforming to best practices in the US or Western Europe. We did see the primary activities of university technology transfer offices focusing on the development of a catalogue of faculty research capabilities and the promotion of that information to industry in the hopes of obtaining contracts for sponsored research. This is a difficult challenge, as industry has a low opinion of the ability of faculty to provide market-savvy solutions to their problems. Academic research and researchers are seen as divorced from the market realities that industry faces.

To summarize, the prevailing notion of technology transfer is about what it was in the US twenty-five years ago: develop a database of faculty research interests and patents, post them on a web site, and wait for the inquiries come from industry. This approach can be summarized as: "If you post it, they will come."

Interviews with both faculty members and directors of university technology transfer offices reveal that there is very little proactive effort to match inventions with commercial applications with potential licensees. Indeed, there is virtually no market assessment of inventions before they are patented. Nor are there formal policies or assistance to faculty members, or incentives to faculty for commercializing their inventions. Additionally, and very significantly, we saw no indication that there are funds available to handle adequate international patenting at the universities. Again, this situation is not unique to Eastern Europe and Latin America; and it is typical of the situation in the US two decades ago.

Though substantial, these shortcomings can be addressed in a systematic and determined manner, if the will exists to address them. Policies and procedures that conform to best practices can be developed and implemented over time, and that time horizon need not be too long. Institutions can develop programs to train staff in technology transfer and commercialization incentives that will motivate faculty to be more aware of intellectual property protection and the process of commercialization.

Changing the academic culture to be more aware of and supportive of this effort will take time and constant effort. But this effort can provide results in the form of changed attitudes and increased success in moving ideas from the laboratory to the marketplace. And the initial successes will provide role models and motivation for others to pursue this path.

We have seen that the raw material for such success exists in Romania. What is needed is the will and the resources to begin on the path of improvement. In the meantime, the business incubators involved in this project can serve as a catalyst to the generators of ICT, whether in nearby universities or individuals in their communities. They can assist these individuals and institutions to commercialize their technologies and to launch these new enterprises with a higher likelihood of success than would have been the case without such excellent resources and drivers in their communities.

## APPENDIX 1: LIST OF INTERVIEWS: ORGANISATIONS VISITED

No	Name	Representative	Date
1	University Popitechnica Bucharest	Rector - I. Dumitrache	16 June 2003
2	ASEBUSS	Rector (M. Duhaneanu) and Director (L. Rasca)	16 June 2003
3	Ministry of Education and Research	T. Ionescu, Director	16 June 2003
4	UTCB	A. Anton	16 June 2003
5	Open Society Foundation	G. Petrescu, R. Nica	17 June 2003
6	ATIC	V. Baltac, Director	17 June 2003
7	ARIES	A. Borcea, President; and ARIES members - IT companies	17 June 2003
8	MEC	R. Damian	18 June 2003
9	CNFIS	R. Munteanu	18 June 2003
10	CNCSIS	M. Popescu	18 June 2003
11	Cooperative Housing Foundation	Bryan Winston, Country Director	18 June 2003
12	Siveco		18 June 2003
13	GeCAD		18 June 2003
14	USAID	C. Mararu, Director	19 June 2003
15	University of Sibiu		20 June 2003
16	University of Craiova		20 June 2003
17	CDIMM Maramures	Radu BIG & ICTWAY staff	21 July 2003
18	BIC Baia Mare	Vlad PASCU & BIC Baia Mare staff	21 July 2003
19	CRPPPI Maramures	Sorin IANCU, Carmen NEACSU	21 July 2003
20	Baia Mare Municipality	Cristian ANGHEL Mayor Petre MITRU strategy staff	21 July 2003
21	TechnoCAD Centre	Nicolae DASCALESCU, Board President	21 July 2003
22	Multinet Ltd.	Petre MITRU	21 July 2003
23	CISCO Academy	Octavian COSMA	21 July 2003
24	North University Baia Mare	Prof.dr. Emil MICU – UBM rector Prof. Dr. Dan PETER – UBM dean	22 July 2003
25	University College	Reader Cezar TOADER – UBM College manager	22 July 2003
26	Vasile Goldis University	Prof. Dr. Viorel POP – Deputy rector & Reader. Dr. Felicia SABAU – Scientific secretary	22 July 2003
27	Orgman Ltd.	Emil MARGINEAN	22 July 2003
28	I-net-platform	Adrian KLEINEGELD	22 July 2003
29	Programing Pool Romania	Adrian KLEINEGELD	22 July 2003
30	BIT Group	Nicolae DASCALESCU, Petre MITRU, Mirel MIHALI, Adrian KLEINEGELD, Emil MARGINEAN	22 July 2003
31	3M – Maramures branch	Sorin Prelucan, manager	22 July 2003
32	Pro Odorhei Foundation	Attila SZABO -trainer Csaba SIMÓ -trainer	23 July 2003
33	BIIC Harghita	Berta BENEDEK, Marta KOVACS & staff	23 July 2003
34	Astral Telecom	András SZOKOL CSISZÉR – technical manager	24 July 2003
35	Miercurea Ciuc Municipality	Dr. Csaba CSEDŐ Mayor	24 July 2003
36	Harghita County Council	György VÁRDAL -Director	24 July 2003
37	UEFISCSU	Adrian CURAJ	25 July 2003
38	TEC Transfer Centre	Cristina SIMION	25 July 2003
39	CBE Bucharest	Cezar Scarlat	25 July 2003

## APPENDIX 2: INTEVIEW PROTOCOL

### Assessment Team Interview Form Romania

Interviewer: \_\_\_\_\_ Date: \_\_\_\_\_

Interviewee: \_\_\_\_\_

Organization: \_\_\_\_\_

Organization Type and Goals: \_\_\_\_\_

The following topics should be discussed as appropriate:

#### **Capital**

- Sources and amount of investment capital for early stage companies
- Investment climate for foreign and domestic investors
- VC activity in Romania
- Angel investors in Romania
- Networks for accessing early stage investment, foreign or domestic
- Governmental financial support for early stage companies

#### **ICT in Romania**

- Source of inventions (intellectual property) in ICT that can be commercialized to form the basis for new ventures
- Where the research is being conducted
- Strengths of Romanian ICT; areas where Romania has a particular competitive advantage
- Strengths of new ICT ventures
- Greatest needs of new ICT ventures

#### **Intellectual Property Protection**

- Ownership of IP developed at universities or research institutions
- Existence of IP policies or legislation
- Process and funding for protecting IP developed at universities and research institutions
- Types of patent protection for IP resulting from research at public universities and research institutes
- Degree of awareness of IP protection and strategies

## **Technology Transfer and Commercialization of IP**

- Existence of technology transfer offices
- What technology transfer offices do
- Support for technology transfer offices
- Assistance for technology transfer activities
- Degree and nature of contacts between industry and universities
- Incentives for faculty and institution

## **Entrepreneurial Culture and Infrastructure**

- Climate for entrepreneurship generally
- Encouragement for entrepreneurs
- Challenges for entrepreneurs generally
- Incentives and disincentives for faculty to be entrepreneurial
- Sources of learning and advice for would-be entrepreneurs
- Entrepreneurial support mechanisms

## **Business Resources and Infrastructure**

- Where do new companies get their initial funding to initiate operations?
  - Government funding?
  - Friends and family?
  - Angel investors?
  - Venture capital?
  - Other?
- Are there networks of informal investors looking to support new companies in Baia Mare (Bucharest)? If so, are they linked to other geographic regions within and outside of Romania?
- Are there entrepreneurial support mechanisms in Baia Mare (Bucharest), such as SME friendly banks; accountants skilled in working with high-tech entrepreneurs; attorneys skilled in intellectual property protection; attorneys skilled in corporate law for SMEs and start-up companies?
- What changes are needed in the local support structure for entrepreneurship to make Baia Mare (Bucharest) a center of innovation in Romania and Central Europe?
- Does Baia Mare (Bucharest) have strong linkages with sources of capital, entrepreneurial expertise and other resources in the U.K., the United States or other countries who could be supportive of Baia Mare (Bucharest) business initiatives? Please describe.
- Is Romania pursuing any international programs for assistance in establishing clusters of innovation such as EU 6<sup>th</sup> Framework Programme, NATO, World Bank, etc. Furthermore, has Baia Mare (Bucharest) explored the opportunities

to obtain not-for-profit grant mechanisms for entrepreneurial initiatives? Are there any on-going “off-set” programs from aircraft, railway or other major contractors who have entered into enormous business contracts with the Romanian Government?

- To what extent do the various players—business, academic, government—talk to and interact with each other? What mechanisms exist to foster communication and coordination of activities?

**APPENDIX 3: NATIONAL STRATEGY OF INNOVATION AND TECH  
TRANSFER**  
(see attached pdf document)