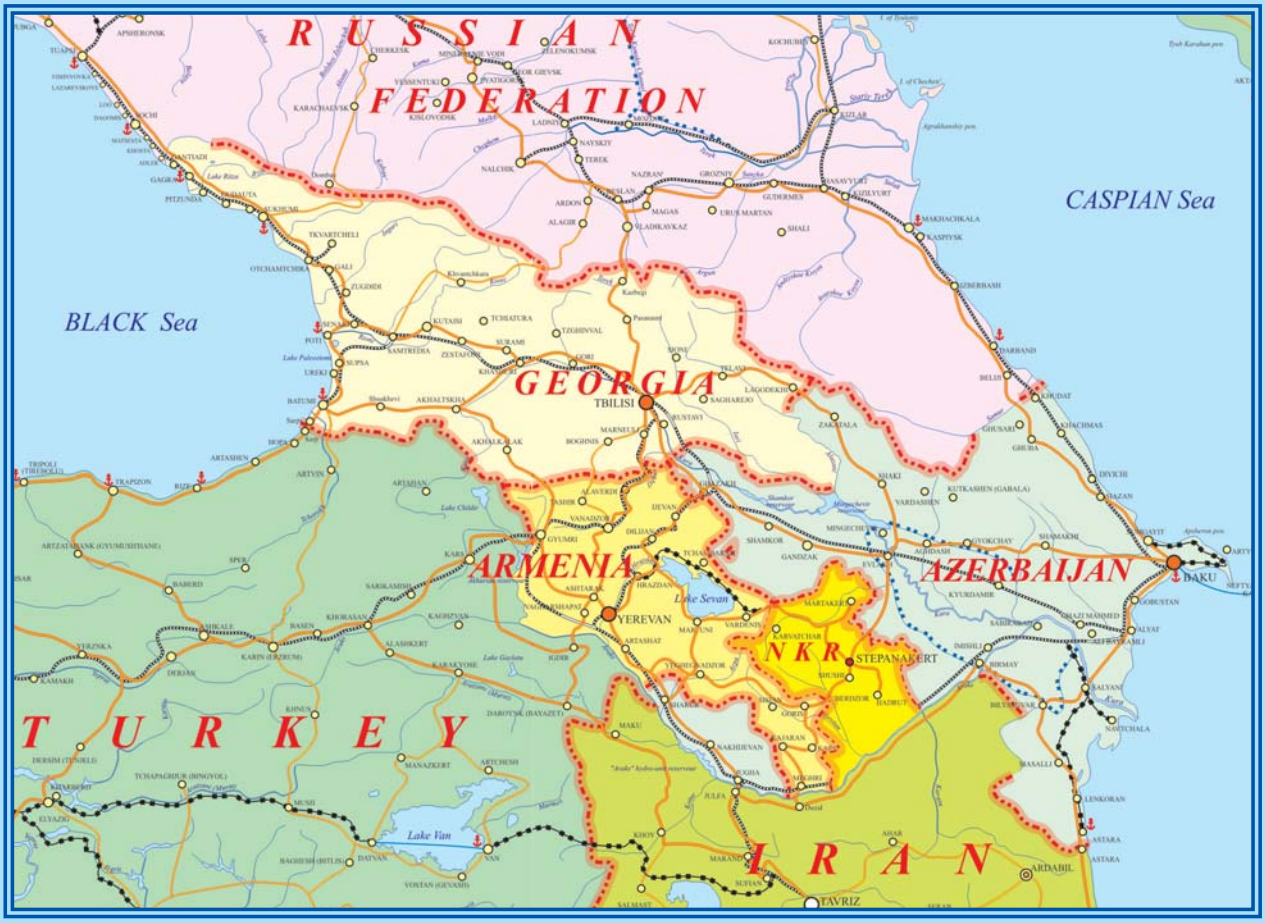
Armenian Development Agency

Electronics Industry in Armenia

CAUCASUS REGION



Content

Electronics Industry in Armenia

Business Environment

Armenian Development Agency

Introduction

Armenia can competitively satisfy the needs of electronic companies seeking to more cost effectively serve customers in Europe, while positioning themselves to exploit new and expanding opportunities in Russia and other CIS[1] countries.

Literally, at the crossroads of East European, West Asian and Middle Eastern markets, Armenia's commanding position is further enhanced courtesy of tariff free access to CIS markets.

At its peak, at the beginning of the 1990's, the Armenian electronics sector was supplying almost 30% of the computer-related equipment for the Soviet defense and space industries. Those days are past but the legacy, in terms of the skills base and intellectual capital, is sufficient to trigger a renaissance of the electronics sector in Armenia with foreign direct investment representing an important catalyst.

Hard facts:

- Armenia hosts around 30 electronic companies employing over 1,700 people, of whom an impressive 70% are skilled and a further 26% are semi-skilled;
- The electronics industry suffered a major negative impact as a consequence of the break-up of the former Soviet Union;
- At its peak, the electronics sector employed 14,600 people generating annual revenues in excess of $200 million;
- Armenia was particularly strong in both the design and manufacture of active and passive components, along with telecommunication, electrical signal and audio / video electronic equipment;
- Out of 8,000 technology students, circa 6,000 are studying at the State Engineering University of Armenia (SEUA) and nearly 2,000 at Yerevan State University (YSU), underpinning combined graduate output of around 2,000 in 2003;
- The customs regime is sufficiently well developed to support “inward processing relief” transactions to effectively serve customers throughout Europe and in the case of the Russian market, Armenian manufactured goods are treated as domestic products;
- The average net monthly salary, within the sector, in 2003 was $60;
- Tough fiscal and monetary policies, combined with a sustained commitment by the Armenian Government to improve the investment climate, have manifested themselves in exceptionally low inflation (average rate of 2.4% between 2001 and 2003) and impressive GDP growth (average rate of 9.8% for the same period). Moreover, in 2004 Armenia was ranked in 44th place above France (45th) in the annual survey of the “Index of Economic Freedom” conducted by the Heritage Foundation / Wall Street Journal[2].

1.Commonwealth of Independent States
2. www.heritage.org/index

Key Benefits

- **Intellectual Capital** - Professional "blue-collar"employees, with higher or technical education within the electronics sector, equate to circa 1,200 (70% of those employed) and this, combined with the annual average graduate output from technical faculties of around 2,000, and the many academic institutions, hold the key to Armenia's future international competitiveness in the sector. Given new employment opportunities, there is no doubt that those skilled technicians and managers who left the sector will return.
- **Education and Academic Interface** - At 99%, Armenia has one of the highest literacy rates in the world and ranks number one in the world for library membership per capita. Currently, 78,000 students are enrolled in 73 universities, most of which are actively collaborating with leading academic institutions around the world;
- **Market leverage** - ability to serve customers in Europe while capitalizing on the burgeoning market opportunities courtesy of Armenia's free trade agreements with the CIS including the Russian Federation with its 150 million consumers;
- **Cost efficiencies** - the average annual savings on the yearly salary bill for a 150 person production or R&D operation in the electronics sector, compared to leading recipients of foreign investment in Central Europe, like Hungary and the Czech Republic, will be in excess of $1.5 million;
- **Local Sourcing** - despite the serious under-capitalization throughout the 1990s, Armenia did host an extensively integrated electronics sector and many of the building blocks for a renaissance, as this publication underlines, are in place;
- **Linguistic Skills** - according to a UNDP survey of the age group 13 to 33, over 30% have the proficiency to conduct business in the English language, which is the third language spoken behind Russian dominating as the second major language.

Skilled Labour Availability and Intellectual Capital

Given the dramatic changes within the electronics sector over the last ten years and the retrenchment that has taken place within the sector in Armenia, there is obviously scope to exploit the technological skill base to support the most advanced forms of electronic processes, production and research and development. However, considering that the vast majority of Armenian electronic companies have retained their in-house design bureaus and that many of Armenia's 96 state funded R&D institutes remain in the vanguard of technological development, this represents a robust platform for innovation and growth.

At 1,700, the electronics sector in 2003 employs over eight times less than it did at the beginning of the 1990s. And like most CIS members and other countries undergoing economic transformation, Armenia has been subject to a "brain drain" since the industry was at its peak. However, it is estimated that emigration from the sector was limited to around 3,000. Consequently, around 8,000 are, potentially, in a position to readily return to the sector as employment opportunities are created.

The most distinctive current feature of the Armenian electronics industry is its exceptionally high skill base.

Labour Availability and Recruitment Experiences

While statistics on graduate output and the skills profile within the sector represent useful indicators, the most accurate barometer, to gauge skills availability, is to share the experiences of electronics and IT companies operating in Armenia which are regularly recruiting as they expand.

✉ *"At present we have a total staff of about 140 IT professionals. At the time of each recruitment campaign for specialist level positions we are receiving CVs of about 30 to 40 qualified applicants, with around 10 persons per position fully satisfying our requirements."*

Ms. Anahit Grishchyan, Human Resource Manager, HPL (a subsidiary of California based, Heuristics Physics Labs, Inc.)

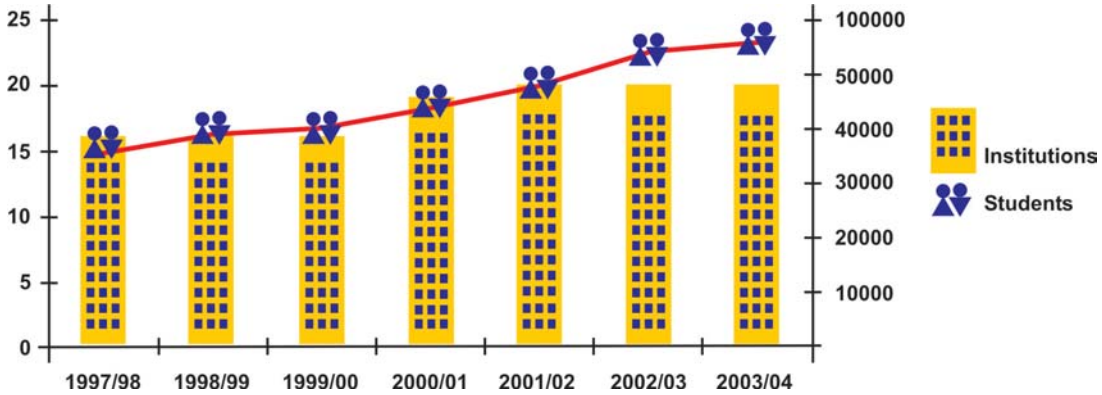
✉ *"Usually, at the time of each recruitment, after detailed assessment of numerous CVs and interviews, we still have three or four qualified IT specialists to select from for each position."*

Mr. Manuk Gevorgyan, Managing Director, Credence Systems (a joint venture of the American company, Credence System Corporation, and Fluency Technology Inc.)

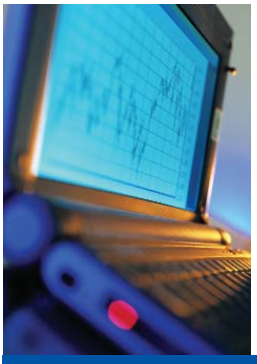
Graduate Output

Out of 8,000 technology students, circa 6,000 study at the State Engineering University of Armenia (SEUA) and nearly 2,000 at Yerevan State University (YSU). In 2003 graduate output from SEUA accounted for 1,460 while the number of graduates from the technology and science departments of YSU exceeded 400.

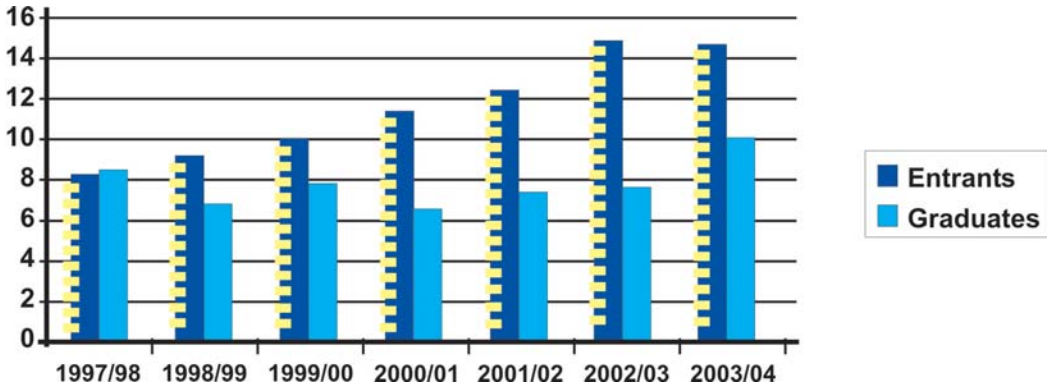
NUMBER OF STATE HIGHER EDUCATION INSTITUTIONS AND STUDENTS



Source: National Statistical Service



DYNAMICS OF ENTRANTS AND GRADUATES IN STATE HIGHER EDUCATIONAL INSTITUTIONS (THOUSAND PERSONS)



Source: National Statistical Service

Cost Efficiencies

Utility costs and corporation tax (at only 20%) are among the lowest in Europe. Moreover, tax breaks, when fixed capital investment exceeds $1 million, further enhance the profitability of establishing a business in Armenia.

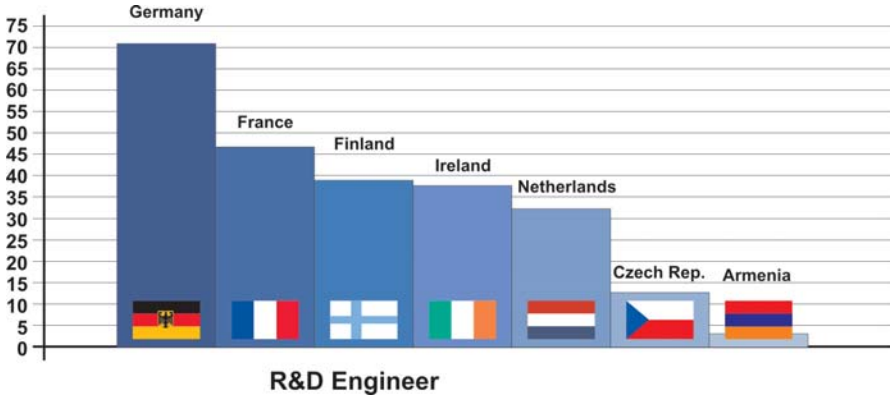
Labour Costs

The average net monthly salary, within the manufacturing segment of the electronics sector was only $60 in 2003.

The average annual growth of real wages between 1999 and 2003 was 11% but coming from such a low base, the Armenian labour force will remain highly cost competitive for many years. Even if the average monthly wage in the sector doubles, the annual labour cost saving in comparison to a leading recipient of foreign investment in Central Europe, for a 300 person operation, would be in excess of $1 million.

Labour "on-costs" - social insurance payments met by the employer, are also low with an indicative range of 18% where the gross monthly salary is $100 to circa 12% for management positions of $300.

Average Annual Salary - 2002 for R&D Engineers (´000 USD)



Source: Mercer Human Resource Consulting for Western and Central European countries

Admittedly, there is scope to improve productivity levels within the sector. This is primarily on account of the very low levels of investment in equipment and, especially, information technologies. However, given the competence and flexibility of the Armenian workforce, foreign investors, who have invested in new plant and equipment and have introduced best management practices and retraining programs, are fast bridging the productivity gap with Western European countries.

R&D and Academic Institutions

Increasingly, innovation and intellectual capital within enterprises hold the key to improved international competitiveness. The same can be said for countries.

As stated, almost all the electronic companies have retained their own in-house R&D labs. The R&D situation within most of Armenia's academic institutions is also impressive. Essentially, they can be categorized in two groups:

1. The institutions operating within the structure of the National Academy of Sciences;
2. Research departments within the structure of Yerevan State University and of the State Engineering University of Armenia.

One: The National Academy of Sciences

Institutions Operating within the Structure of the National Academy of Sciences	Distinctive Characteristics, Strengths and International Collaboration
Institute of Mathematics	Established in 1971, the main fields of activity include approximation theory along with mathematical problems of statistical physics. The Institute has organized several international conferences on functioning theory, integral geometry and mathematical physics. Extensive scientific collaborations are conducted with leading centers around the world including, University of Freiberg (Germany); University of Paris - IV (France); Tsucuba University (Japan) and the Royal Institute of Technology (Sweden).
Institute of Mechanics	Established in 1955, the main fields of activity include mathematical theory of elasticity along with the theories of plasticity and viscoelasticity. Joint scientific investigations are carried out in collaboration with Berkeley University of California; Pierre and Marie Curie University of Paris and the University of Pavia, Italy.
Institute of Informatics and Automation Problems	Specializing in activities including theoretical and applied investigations in the area of computer science and artificial intelligence, the institute was established in 1957. Main collaborative partners include University of Osaka (Japan); University of Tampere (Finland); University of Darmstadt (Germany) and the Research Institute of Automation and Computer Sciences of the Hungarian Academy of Sciences.

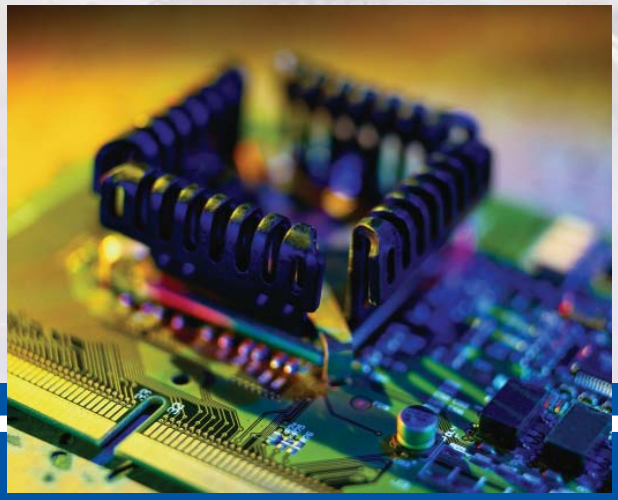
Institute of Applied Problems of Physics	Established in 1980, areas of activity include the interaction of electromagnetic radiation and influence of external factors on physical properties of semiconductors and liquid crystals along with information exchange between biological objects.
Institute of Physical Research	Established in 1968, key activities include laser physics; high-temperature superconductivity; and crystal growth equipment.
Institute of Radio Physics and Electronics	Specializing in the area of radiophysics and solid state plasma physics, the institute, which was established in 1960, provides specialists engaged in the NATO "Science for Peace" project and plays a prominent role in environmental investigation and biomagnetic applications.
Engineering Center	Established in 1990, main activities include atomic optics; growth and investigation of non-linear optical crystals and therapeutic lasers.
Special Experimental and Design Technological Institute	Established in 1976, main activities include accelerometers, velocimeters and other seismic observation equipment.
Garni Space Astronomy Institute	Specializing in the development and manufacture of devices and astronomical complexes for space research, the institute was established in 1982.

Two: Yerevan State University (YSU) and State Engineering University of Armenia (SEUA)

Yerevan State University

YSU hosts a major research facility - "Laser Technology Research and Production" - along with 26 scientific labs focusing on astrophysics, radio physics, solid-state physics and physical chemistry.

Currently, YSU has collaborative agreements with 58 universities in 23 countries including the United States (Fresno, Riverside, Michigan, Northeastern and George Mason); France (Montpellier, Lyon, Marseilles and University of Paris); United Kingdom (University of London) and Germany (Rostock University).



YSU has 4 Key Technology Related Faculties:

Technological Faculties	Departments	Technological Faculties	Departments
Radio Physics	Semiconductors & dielectrodes Super high frequency radio physics Quantum radio physics Higher mathematics	**Computer Science and Applied Mathematics**	Applied analysis Algorithmic languages System Programming Discrete mathematics Maths methods / modeling Algebra in computer science
Physics	Laser technology Optics Theoretical physics Nuclear physics Solid state physics Quantum physics Molecular physics	**Mathematics**	Differential equations Mathematical analysis Theory of probabilities Algebra and geometry Theory optimal control

State Engineering University of Armenia

With extensive campuses in Yerevan, Gyumri, Vanadzor and Goris, SEUA provides majors in 63 disciplines and hosts several advanced and extensive R&D facilities including:

- Mathematical simulations and computer aided design;
- Fiber optics communications;
- Powder metallurgy and plating;
- X-ray diffraction of material structure analysis;
- Neutronal nets;
- Photoactive and semiconductor parameter measurement;
- Boundary value problems of differential equations;
- Tenzo-semiconductive transducers;
- Small power systems

Through the TEMPUS TACIS program and directly, SEUA has established an impressive list of partner universities and centers of excellence throughout the world. Courtesy of a collaborative agreement with the Lycos Company and the Enterprise Incubator Foundation, SEUA established an “Internet Technologies” scientific educational center and introduced a new specialized Bachelors degree in Internet Technologies.

CANDEL Project

The world's seventh third generation synchrotron radiation center will be in Armenia and is scheduled to be operational by 2007. The $50 million investment on a 20 hectare site on the outskirts of the capital city, Yerevan, will produce light with special features permitting unprecedented industrial research and development studies covering a wide range of applications in pharmaceuticals, biotechnology, and, especially, microelectronics.

Armenia was selected on account of the number of qualified scientists in physics, expertise of academic institutions and impressive track record in terms of successfully running the electron accelerator established in Yerevan in 1967. Funding for the project is courtesy of the US Department of State, European Union countries and Armenian Diaspora members.

Business Environment

Investment Climate

That the Armenian Government adopted the Law on Foreign Investment, entitling international companies to the same treatment as indigenous enterprises, almost ten years ago, reflects the deep-rooted commitment to sustaining improvements to the investment climate in Armenia. As a consequence, the country's trade and investment policies are now recognised as the most "open" in the CIS by international organisations. Moreover, the World Bank assessment of policies and institutions currently ranks Armenia ahead of Poland and on par with the new members of the European Union from the Baltic States.

According to the World Bank's report "Doing Business in 2004", which compares the business climate in different countries using a range of indicators, Armenia rates in a comparatively high position. (For detailed information see http://rru.worldbank.org/DoingBusiness/ExploreEconomies/ BusinessClimateSnapshot.aspx?economyid=10).

According to the World Bank Report on "Corruption in Enterprise-State Interactions in Europe and Central Asia" Armenia is ranked as the 5th least corrupt country out of 26 transition countries in Eastern Europe and Central Asia. Armenia is ranked as being less corrupt than such countries as Czech Republic, Russia, Latvia, and Poland.

Sound fiscal and monetary policies have manifested themselves in exceptionally low inflation (average rate of 2.4% between 2001 and 2003), impressive GDP growth (average rate of 9.8% for the same period) and a stable currency which is freely convertible.

Ten years after becoming a founder member of the CIS in 1991, Armenia became a member of the Council of Europe and, importantly, in December 2002, joined the World Trade Organization.

The European Union accounts for almost 40% of all Armenian exports with the CIS representing almost 20%. During the period 1999 to 2003, average annual export growth, at 26.4%, was three times higher than the average annual increases in imports of 8%.

Infrastructure

The 13.9% real growth in GDP in 2003 was fuelled, to a considerable extent, by the 44% increase in construction expenditure, of which much was spent directly on improving the transport infrastructure.

Recognizing the importance of airfreight services for Armenian exporters and foreign investors, the EBRD provided a $22.8 million loan in 1994, with a further contribution of $5 million from the Armenian Government and airport authority, to establish an Air Cargo terminal at Zvartnots Airport, Yereven. Currently, around 10,000 m^2 are available offering advanced handling and customs clearance facilities.

While there is still scope to improve the telecommunications infrastructure, the operator, ArmenTel, primarily owned by the Greek company OTE SA (Hellenic Telecomunication organization), has to date invested around $235 million and approximately 70% of the Yerevan network has been digitalized. In terms of GSM, roaming agreements have been established with over 135 operators in 66 countries.

Customs Regime

Armenia has a liberal foreign trade regime with a transparent "two-band" import tariff (at 0% and 10%) and is fully compliant with WTO rules. There are no import duties on the import of capital goods (included within the master list defined by the Government of Armenia) and inward processing relief facilities are available - **www.customs.am**

Real Estate / Technology Parks

ADA has a data base, which is regularly updated, of greenfield and brownfield property options.

Whilst there are opportunities for international companies to invest in Armenia through the privatisation process (please refer to **www.privatization.am**) and joint ventures, which the ADA would be pleased to facilitate, the greenfield route will increasingly become the favoured option.

There are two high tech facilities available in Yerevan.

Viasphere Technopark

Viasphere Technopark, a subsidiary of Viasphere International headquartered in California, USA, is a state of the art technology park located in Yerevan, Armenia.

Viasphere International is a Silicon Valley based incubator and accelerator with a proven track record in building successful high technology startups and multinationals. Viasphere is affiliated with venture and angel funds as well as industry groups and universities in the US, Europe and Far East.

Viasphere Technopark is centrally located in Yerevan and has been operating since 2001 currently hosting several successful US-based subsidiaries and Armenian origin startups developing advanced software in a variety of fields.

Viasphere Technopark provides companies, in particular startups, with strategic advantages. In Armenia, Viasphere Technopark interacts with technical universities and institutes in areas of advanced research. With facilities, infrastructure, and support services already in place, companies can achieve speed to market with minimal startup costs.

Viasphere Technopark has access to highly qualified software development talent in the following fields of Information Technology:

- Electric Design Automation (EDA) Software
- Computer Aided Design (CAD) Software
- Security and Encryption
- Business Process Management
- Network Management
- Embedded Software
- Educational and Gaming Software
- Web Infrastructure

In addition to providing a vital bridge to Silicon Valley, USA, Viasphere Technopark provides the following facilities, infrastructure and support services to companies for cost effective speed-to-market and scalability:

- 8,000 square meters. of office space situated on 2 hectares of land with planned expansion to 28,000 square meters.
- High speed Internet access
- Clean room development environment
- Cafeteria services including catering for on campus events
- Library Facilities
- Convention facilities and fitness club (planned)
- Security with 24x7 access

Enterprise Incubator Foundation (EIF)

EIF provides office space and services to local and international IT companies. The list of facility services includes the following options:

- Lease of space of various sizes
- Shared meeting and conference rooms with equipment
- Shared resource center with access to literature, on-line databases, etc.
- Shared printer, fax, and copier services
- Local area network and high-speed Internet connection
- Security with 24x7 access
- Parking facilities

The Incubator facilities are located at the Russian-Armenian (Slavonic) State University, 15 minutes drive from Republic Square. The facilities occupy 4 floors with total space of 1,900 square meters.

Armenian Development Agency

The Armenian Development Agency (ADA) was established by the Government of Armenia to facilitate foreign direct investment and promote exports. The Prime Minister of Armenia is the chairman of the board. The ADA acts as a "one-stop shop" agency for investors assisting them in setting up their business in the country, helping with project implementation, performing a liaison role with the Government, providing information on investment opportunities in the country, as well as investment related regulations and laws. In its export promotion activities the ADA helps to find export markets for products, undertakes market studies and seeks out partners for joint ventures aimed at increasing the volume of exports.

Business Support Council

To provide an effective mechanism to monitor the improvement in the investment climate, the Business Support Council (BSC) was established by a Presidential Decree in early 2001, and the Armenian Development Agency was appointed the secretariat to act as an intermediary for the business community. Chaired by the Prime Minister, the evenly balanced private/state membership (the Chief Economic Adviser to the President, the Ministers of Trade and Economic Development, Finance and Economy, the Mayor of Yerevan, the Executive Director of ADA and six representatives from the business community on a rotation basis) represents a powerful and influential vehicle to improve the business and investment environment and eliminate administrative barriers to investment.

Multilateral Investment Guarantee Agency

The Multilateral Investment Guarantee Agency (MIGA) is a member of the World Bank Group and promotes foreign direct investment into emerging economies through:

- Political risk insurance;
- Advisory and capacity-building services for investment promotion intermediaries; and
- Online information on investment opportunities worldwide.

It is widely recognized that the investment climate in Armenia has improved dramatically in recent years. However, to further enhance investor confidence, attention is drawn to the fact that MIGA can provide political risk insurance, guaranteeing new, cross-border investments, as well as investments associated with expansion, modernization, or financial restructuring of existing projects, and acquisitions involving privatisation of state enterprises. **www.miga.org**

Our Contacts

Armenian Development Agency

Managing Director

Dr. Vahagn Movsisyan
Tel: (374 1) 570170
Tel/Fax: (374 1) 542272
E-mail:vmovsisyan@ada.am

Investment Promotion Director

Dr. Natalya Artsruni
Tel/Fax: (374 1) 570710
E-mail:natalya@ada.am

Investor Servicing Director

Dr. Arthur Babayan
Tel/Fax: (374 1) 577760
E-mail:ababayan@ada.am

Export and Enterprise Development Director

Dr. Mushegh Sargsyan
Tel: (374 1) 570510
Fax: (374 1) 559517
E-mail:m-sargsyan@ada.am