

Progress Report on Computer Science Program at AUA

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The Basic Premise

There is a convincing argument that computer science/information technology/software engineering (collectively denoted hereafter as CS) is an area of opportunity for Armenia to grow. There has been a strong tradition from the Soviet times, the prerequisite cultural setting exists, development in this area does not require transportation of goods, and the Internet provides the necessary means for communication and transfer of knowledge and products. A burgeoning software industry has emerged in Yerevan in recent years (15 Armenian-owned firms, 9 U.S. firms, together employing approximately 400 software developers) that appears to be growing fast. Considering the overwhelming importance of this field in the future development of Armenia in education, technology and commerce, it is felt that AUA will have failed in its mission if it remains an inactive observer. Given this premise, the question is what role should AUA have in advancing this field.

Background

The idea of developing a computer science program in AUA has been discussed in the past. This year, concrete steps were taken to explore the various possibilities:

1. On June 10, 1998 a meeting was held at the State Engineering University (SEU) with Rector Y. Sarkissian, the Chair of CS Department Rouben Argashian, the Dean of Graduate Division Albert Poghosyan, and several CS faculty.
2. On June 11, a meeting was held with Y. Shoukourian, Vice President of the Academy of Sciences and Director of the Institute of Informatics and Problems of Automation.
3. On June 18, 1998 a meeting was held at the Yerevan State University (YSU) with Rector R. Mardirossian, the Chair of CS & Applied Math Department Vladimir Yeghiazaryan, Vice Rector Edward Ghazarian, and Rafael Matevosian.

The main purpose from these meetings was to inform these universities about AUA's interest in developing a CS program and to seek their views. It is important to note that SEU currently awards B.S., M.S. and Ph.D. degrees in CS, whereas YSU has a B.S. program and is developing a M.S. program. Furthermore, the Academy is considering the possibility of developing a graduate program of its own. Both YSU and the Academy award Ph.D. degrees in this field.

The initial reaction at all three meetings was negative. The leaders of the two universities and the Academy feel their programs are good and have produced many highly successful graduates. They feel the demand within Armenia does not warrant the need for another program. It is also clear that the CS programs within YSU and SEU are in high demand relative to their other programs. (In other words, these are their "jewel-of-

the crown” programs.) A competition from AUA with its “vast” resources, they fear, could decimate these programs and deal a serious blow to these universities. Further discussions produced other results, as described below.

Prior to my September visit to Armenia, I contacted Rectors R. Mardirossian and Y. Sarkissian and Vice President Y. Shoukourian and asked them to send representatives from YSU, SEU and the Academy, respectively, to a “working group” meeting to further discuss the AUA CS program. A meeting was held at AUA on September 17, 1998 with the participation of the following representatives:

- Rouben Topchyan (YSU)
- Yrui Movsesian (YSU)
- Vladimir Yeghiazaryan (YSU)
- Samvel Shoukourian (YSU, Academy)
- Rouben Agashian (SEU)
- Vazgen Melikian (SEU)
- Edward Poghosyan (SEU, AUA, Acadmey)
- Armen Nazarian (AUA)
- Igor Mkrtumian (AUA)
- Artak Hambarian (AUA)
- Hovhannes Avoyan (AUA, Industry)
- Armen Der Kiureghian (AUA)

After four hours of sometimes heated discussions, the group came to agreement on a number of important points. Everyone seemed to agree that the existing programs had a number of serious shortcomings, particularly in the areas of resources, new technologies, and training to meet market needs, that there were important gaps in the existing programs that AUA could fill, and that there was an acute need for continuing education and retraining. Everyone seemed to agree that some form of a joint program centered at AUA would be acceptable to all. The group decided to continue its work through the establishment of a shared electronic mailing list. This list (named csms@aua.am) was later expanded to include a number of CS specialists from the three universities as well as the industry. More recently, selected individuals from abroad have been added to this list.

On September 18, 1998 a meeting was held with Andranik Hovhannisyan of HPL-Armenia, Ashot Hovhannisyan of Hybrid Consulting, Hovhannes Avoyan of CEDIT, and Igor Mkrtumian of AUA. They provided the views of the CS industry in Armenia on the issues discussed by the working group.

In addition to the above, I have discussed the CS program options with the following individuals in the U.S. and Armenia: CS Professor Larry Rowe (UC Berkeley), CS Professor Susan Haynes (University of East Michigan, AUA), David Lepejian (CEO, HPL California), Roger Strauch (CEO, Roda Group), Razmik Abnous (Director of Software Development, Documentum), Jora Manucharian (CS consultant, Los Angeles) and Richard Youatt (AUA).

Last October, Armenia’s Minister of Industry and Trade requested input from selected individuals on the potentials and problems in developing the software industry in Armenia. A report was prepared by Edward Poghosyan on behalf of the CSMS group. Another report was prepared by Andranik Hovhannisyan of HPL-Armenia. Copies of

both reports are attached. They contain excellent information regarding the present state of affairs both in education and industry, and the potentials and problems in further developing this field in Armenia.

Options for AUA

It is my view that it would be wrong for AUA to unilaterally decide on establishing a CS program of its own. We cannot claim that such a program is complementary to the existing programs in SEU and YSU, unless we develop it with a very narrow focus, which would not be worthwhile. A unilateral move would generate resentment towards AUA. In spite of their current problems, the existing programs in the two universities have respectable records and presently are in strong demand in their applicant pools. A unilateral decision by AUA could seriously harm these programs, and by extension the two universities and the Armenian higher educational system as a whole. At the same time, AUA cannot remain disinterested in this area. AUA should find its proper role in advancing the field of CS in Armenia and take action soon. Otherwise, we will have failed in our mission as an American institution of higher learning in Armenia.

Based on the information that has been gathered and the discussions that I have held, I have come to the conclusion that AUA's options are one or more of the following:

Develop Continuum Education/Retraining Programs

The demand for continuum education and retraining courses in Armenia is high. There is need for two types of programs:

- (a) Short continuum education courses aimed at introducing new and focused technology areas for the benefit of employees of existing software companies. The faculty should be primarily visitors, though some participation by local experts is possible. The topics for such courses must be selected in close collaboration with industry leaders. It is expected that the local industry will be willing to bear the cost for these courses.
- (b) A more basic, broader and longer program, possibly a six-month certificate program, aimed at retraining the unemployed and unemployable past CS graduates of SEU and YSU (estimated to number around 2-3 thousand). These graduates may have adequate knowledge in some basic areas of CS, but lack modern CS training and presently are not employable. Training in both the English language and CS topics over a period of six months or longer is envisioned. The faculty for this program can be drawn from local experts, with some participation from visiting experts for short periods towards the end of the program. The cost for this program can be covered partly by the local industry and tuition/fees, but funding from external sources will be necessary.

Regardless of our decisions regarding other options listed below, it seems worthwhile, almost obligatory, that we establish one or both of the above programs. The number of US-owned software firms in Armenia is growing fast. There seems to be an expectation that, as an American university, we will help train the employees and prospective employees of these firms in a field where the United States is the undisputed world leader. This program must have our highest priority for rapid implementation.

Develop a Joint CS Program

A joint masters program in CS can be developed in conjunction with YSU, SEU and NAS with the following elements:

- a) The program will have 2 to 2.5 years duration.
- b) Students will be admitted into the existing or developing M.S. programs in YSU, SEU and NAS. The first year of education will be completely conducted at these home institutions. The focus will be on basic CS subjects in which these institutions excel. AUA will provide some resources, e.g., a computer lab for shared use.
- c) Among the pool of students in all three programs, a subgroup will be admitted into the joint program with AUA. AUA will have full control over the admission process. The admission criteria may include proficiency in the English language, academic standing in the respective CS program, and performance on an appropriate standardized test. Starting in the summer after the first academic year, the admitted students will be provided intensive English language training at AUA.
- d) The second year of the joint program for the admitted students will be conducted at AUA by a faculty team selected and hired by AUA. The instructors will include some of the faculty from YSU, SEU and NAS, as well as visiting faculty from abroad. Students not admitted into the joint program will continue their education in their respective universities and, upon completion of their program, will receive a corresponding degree. Students admitted into the joint program, upon successful completion of the joint program, will receive a diploma issued jointly by their home institutions and AUA.
- e) The joint program will be designed with a focus aimed at preparing future leaders of the CS industry in Armenia. As such, it will have an applied orientation (rather than being theoretical and research oriented) and will include appropriate management, marketing and finance courses as well as CS courses. The program will have several areas of emphasis. These may include (very roughly): (a) New technologies, e.g., object-oriented, component-oriented programming; new programming concepts such as Dcom and Corbal; Java programming, etc. (b) Advanced computer systems, such as Unix operating system, network administration. (c) CS management topics, such as software project management, software quality control and assurance, software reliability. (d) Electronic business topics, e.g., e-marketing, e-banking, e-sales; and (e) Information technologies, MIS, advanced data bases. The program will be designed with the joint effort of faculty from AUA, SEU, YSU and NAS, with advice from leading CS practitioners in Armenia and selected leaders in the U.S. who have demonstrated interest in the development of related fields in Armenia. An Advisory Council will be appointed with the participation of the industry leaders to annually review the program and provide advice on new directions and emphases.
- f) AUA will provide a dedicated computer lab for the joint program consisting of advanced workstations (one per student), all necessary software, and a high-quality Internet access (as a minimum, one or preferably two T1 lines must be provided). State-of-the-art books, journals, CDs and other published material will be made available through the library.

- g) The funds for the AUA portion of the joint program will be born by AUA. Possible sources of revenue may include: (a) student tuition and fees, (b) commitments from CS industry in Armenia, particularly those with headquarters in the United States, (c) grants from U.S. government agencies (USIA has recently shown some interest in this area), (d) donations from AGBU and the Armenian community.

The Oakland office has collected and sent to Yerevan CS programs from UC Berkeley, UC Irvine, UC Santa Cruz, USC, Stanford, SF State University, San Jose State University, and Chico State University. I have asked the CS Working Group members to review these programs and develop model programs for the joint program. Model programs from UC Berkeley Extension have also been provided to Igor Mktrumian and Atken Armenian for the development of model continuum education and retraining programs.

Develop a Double-Degree Program

A double degree program in CS can be developed in conjunction with YSU, SEU and NAS with the following elements:

- a) The program will aim at preparing a cadre of CS specialists with good command of the English language, business/marketing principles, and in-depth specialization in selected CS fields, who will be able to take leadership positions in the burgeoning Armenian CS industry.
- b) The program will have a one year duration, including a 3-month intensive English training period. It will depend on training in basic CS subjects at the home institutions (YSU, SEU, NAS) and provide in-depth specialization in selected fields. Possible specialization areas may include (a) new technologies, (b) advanced computer systems, (c) CS management topics, (d) electronic business topics, and (e) information technologies.
- c) Applicants to the program will be selected from present or past graduates of the Masters programs in YSU, SEU and NAS. These students will be required to complete and receive their degrees in their home institutions. However, these programs may agree to waive certain elective units in view of additional courses that the students will take at AUA.
- d) Faculty for this program will be selected from CS faculty at YSU, SEU and NAS, as well as visiting faculty from the United States. Hardware, software and literature resources will be made available to all programs, as described in item (f) of the previous section. Note that the quality of the AUA part of the double-degree program will directly depend on the quality of the program in the home institution. Thus, AUA will do everything possible to help these programs with resources.

Develop an Advanced Center for CS

Several individuals have expressed interest in seeing AUA take the leadership in developing an advanced center for CS that brings together the experts in the field in a well equipped center that conducts teaching, research, and development work together with visiting specialists. The relation of such a Center with the existing programs has not been discussed. There appears to be considerable interest in such a center. Moreover, it is

generally understood that only AUA has the capability to muster enough resources to make such a center a reality. However, it should be clear that planning for such a center makes sense only after AUA has developed a program and experience in the area of CS.

Career Development

One idea that has repeatedly come up in our discussions, is the need for developing job opportunities for the CS graduates (either from a certificate or a degree program). If AUA pursues any of the options described above, it should also make parallel plans for developing job opportunities. Otherwise the graduates will easily find their way out of Armenia into well paying jobs abroad. For this reason, it is very important that the CS program be closely coordinated with the real needs of the industry in Armenia. Furthermore, as an American university, AUA should take concrete steps in promoting the potential for developing a CS industry in Armenia among American companies. Mechanisms for developing linkages between Armenian and American CS firms must be developed.