Program engineering in Azerbaijan

Sh.J.Mahmudova, T.A.Bayramova

Abstract— The establishment and development stages of program engineering in Azerbaijan are provided. As a result of continuing and sustainable development policy of Azerbaijan in current stage, information-communication systems development are described. The works to be carried out for program engineering to gain a specific importance in the economy and the problems in this sphere are specified.

Index Terms— brainware, critical systems, information society, program engineering, software.

I. INTRODUCTION

Software enginering is a field directed to creation and application of software of science and technology.

In recent years, many changes have taken place in the practice of software engineering. The annual income of software industry costs hundreds of billions of dollors and continues to increase. The collection and analysing of productivity indicators, which is one of the basic methods on the project management, is also consistently used in the software engineering and has become an integral part of it. As in other engineering subjects, various design methods and models are also used in software engineering.

In spite of the great success of software engineering, the crisis continues in programming.

The USA spends more than 200 billion dollars on more than 170 000 PT projects per year. 31.1 % of them is closed without coming to and end, 52.7 % project exceeds the predefined price. The losses are measured in trillions in the result of failure of the required effect in the PT application.

The statistical data based on 30000 project under the use of software in American companies has been shown in Figure 1.

II. DEVELOPMENT STAGES

The development of information-communication technology and systems performing based on this caused the difficulties in the process of development, accompaniment and improvement of software. The increase of the capacity of program complexes, of the complexity in terms of architecture and technological solutions necessitated the engagement of quite a large specialist collectives for the development of such programs.

The specified factor required the regimentation of all specialists' peformance participating in systematization of requests, development, accompaniment of software and its adaption to user requests. Program engineering mainly considers the complex solution of such issues.

 Shafagat Mahmudova, Azerbaijan National Academy of Sciences, Institute of Information Technology, Baku, Azerbaijan, +994 12 5398719.
 Tamilla Bayramova, Azerbaijan National Academy of Sciences, Institute of Information Technology, Baku, Azerbaijan, +994125398719.
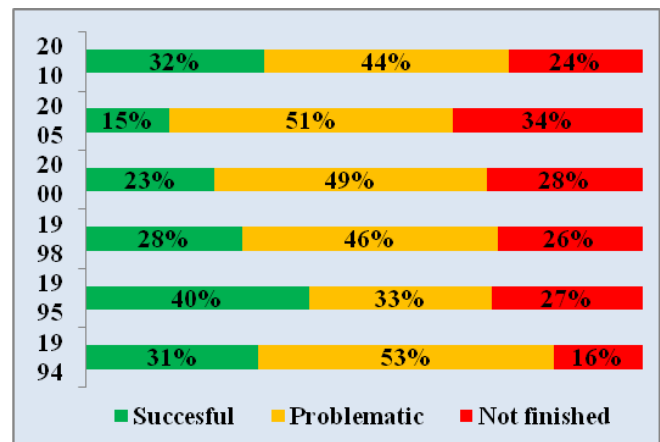
Figure 1. The statistical data based on 30000 project under the use of software in American companies

Succesful - all the work was carried out in time and in accordance with the budget supllies;

Problematic - an extension of time, deviations from the budget, or the requirements have not been fulfilled correctly;

Not finished – because of spending budget prematurely or being bad quality, it was unable to come to an end.

In Azerbaijan, the science of cybernetics and programming has commenced to be shaped starting from 60's (For comparison, it's worth to mention that this sphere has been developed starting grm 1985 in India, the country which is considered as a leader on export of program products in the world). During USSR period, as in other republics, computer sciences have been developing in Azerbaijan. Thounsands of specialists worked on programming problems. Those specialists possessed quite large knowledge in science spheres such as applied mathematics and cybernetics. Although during Soviet rule programmer position existed as a specialty in state system, program engineering mentality has not been shaped yet. After the collapes of USSR, the majority of specialists became unemployed. By that time, very few programmer collectives existed. In the end of 80's and in the beginning of 90's a "trend", a spurt happened in programming in the world [1]. We must regretfully mention that because Azerbaijan has mised that "trend" for the known reasons, it has no capacity to compete with leading countries on this sphere at current time.

After Azerbaijan gained its independence once again, dynamic development in economic and socio-economic sectors has been achieved owing to successful external and internal policy conducted, reforms and large-scale project carried out inrepublic. The international prestige, defence power, the increase of economic potential of republic and improvement of well-being of population have created a strong basis for Azerbaijan government to stand abreast the development countries of globalized world.

In current stage, being one of priority trends of continuing and sustainable development of Azerbaijan, information-communication techno-logies (ICT) has rapidly

penetrated all spheres of socio-economic system and daily spheres of people and become an inseperable part of development of the economy in Azerbaijan. It is known that economic development of Azerbaijan is based on oil sector. It is not a coincidence that a great attention and concern is directed to ICT sector and the president of the country has proclaimed ICT sector as a second priority sphere after energy sector. Hence, as an alternative sphere to oil sector in the country, the development of ICT sector is specifically considered. The State Program on communication and information technologies development in Azerbaijan (Electron Azerbaijan) was adopted for 2005-2008 years. The measures considered in "Electron Azerbaijan" Government Program covered the initial works to be carried out for the provision of transition to information society. 2013 year was proclaimed as "Information-communication technologies year" in our country with the decree of Azerbaijan President [3]. Considering the development and implication of new technologies in different spheres of our life in 2013, the President of Republic of Azerbaijan has adopted the decree on the establishment of Information Technologies University for the purpose of strenghtening the cadre potential.

According to research of UN Department of Economic and Social Affairs (UN DESA), the diagram has been prepared indicating the rating of e-goverment ratings in 2012. In this table 1 and figure 2 Azerbaijan occupies 96th place.

In global information society the knowledge becomes a commodity, as a result knowledge economy is shaped. The establishment of knowledge-based economy without educated people possessing high motivation and professional knowledge is very difficult. The educational and scientific potential in information technologies sphere is highly sufficient in our country. In high technologies sphere, it is desirable that Azerbaijan would export own products. By directing the income gained from oil sector to human resources development, Azerbaijan can occupy fitting place in ICT sector among development countries. By ICT products, hardware, software and, brainware as a bit larger definition products are considered. While system software and hardware products are supervised by well-known and major companies, our state can gain profits in the competitive market by developing software, brainware products [2].

Table (1): E-goverment rating in 2012 in Azerbaijan

№	Country	Rating
91	Uzbekistan	0.5099
92	Thailand	0.5093
93	Mauritius	0.5066
94	Armenia	0.4997
95	Maldives	0.4994
96	**Azerbaijan**	**0.4984**
97	Indonesia	0.4949
98	Jordan	0.4884

It must be mentioned that there is a reason for Azerbaijan becoming the regional center in high technologies sphere. In the report prepared by International Trade Center (jointly with UN and World trade organisation) it is mentioned that Azerbaijan possesses a potential for becoming a leader in Transcaucasus cybernetics market on ICT. Owing to cadre potential, the pespectivity of information technologies (IT)

market and advantegeous geographical location, Azerbaijan can be in the center of all regional projects [4].
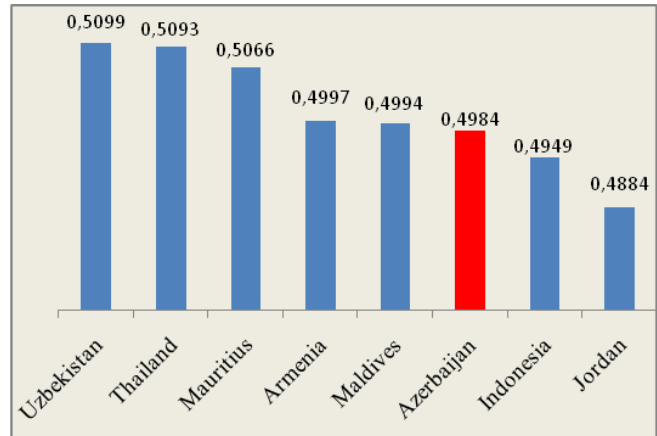

Figure 2. The diagram indicating the development rating of some e-governments

Considering all these factors we can state that it will be reasonably to talk about shaping of "electron economy" in Azerbaijan in near future and program engineering will gain a specific importance in economy in relationwith rapid development of ICT.

Program engineering is not only concerned with development of software. Alongside with technical sides of the analysis and documentation of requirements directed to program, projecting, development of program code, testing and attestation, operation and accompaniment stages, each program covers economic aspects of those software. Only a particular part of programs are carried out in accordance with budget facilities. In others, departures from budget, postponement problems occur. Some programs are not able to be terminated due to spending of the budget prior to deadline or to low-quality. Thus, skilled experts are required for the accurate estimation of prime cost of software, the provision of efficient performance of the system to be developed, program engineering management sphere for accurate selection of the collective carrying out the project. Information security imposes specific duties on program engineers. The most important of those is the production of products developed and tested by our local programmers in information systems serving to national interests.

III. PROBLEMS

Lets mention the several important issues standing in front of Azerbaijan for occupying the place abreast the developed countries in program engineering:

1. The absence of state program directed to program products development in Azerbaijan;
2. The few number of experts attained the international certificates (In Azerbaijan, there is no enterprise that attained CMM certificate, for comparison, lets mention that in India, more than 300 enterprises attained CMM certificate, 27 of them have 5th level CMM certificate);
3. The absence of management systems of production quality known by programmers and experts trained in accordance with world standards in project management;
4. The absence of standards in this sphere in the country.

The absence of large-scale program projects in Azerbaijan does not allow the program engineering to shape as an industry. As a result of the cheap assessment of programmer labor, low level of education, absence of educational specialties for the training of IT-specialists, we have to face the cadre migration.

IV. CONCLUSION

Nowadays, one of the most important issues is the creation of productive environment for development of program engineering, the increase of interests of IT specialists to this sector, Internet-forums, electronic notifications, periodicals, practise in program engineering based on exhibitions and seminars, the exchange of information and knowledge. The preparation of books and other publications in Azerbaijani language is also important.

Refering to world standards, the adoption of modern standards in progrem engineering at state level, the approval of appropriate education and scientific specialties, the attraction of IT experts for education abroad for the increase of professional skills is important.

The main objective of information society must constitute of the creation of relations with foreign organisations specialising in program engineering, the participation in the development of modern international certification systems, the assistance to certification of Azerbaijan software companies in accordance with ISO and CMM standards and etc. For the purpose of discussion and investigation of solution trends of these issues, it will be useful to realization of round tables with the participation of IT-specialists, programmers and etc.

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Safagat Mahmudova is head of sector at the Institute of Information Technologies of ANAS. S. Mahmudova has the degree of Doctor of Philosophy of technique. She is the author of 30 scientific works and 35 theses. Sh.J.Mahmudova was elected deputy editor-in-chief of International Journal of Intelligent Information Processing (IJIIP), and a member of editorship of Gconference.NET portal, and a member of the International Association for Pattern Recognition (IAPR). Sh.J.Mahmudova was elected a reviewer of International Journal of Automation and Power Engineering. The journal is published by the Science and Engineering Publishing Company (Riley, Indiana, USA). Sh.J.Mahmudova was elected a reviewer of Journal of Control Engineering and Technology (JCET). Was elected as a member of the International Association for Pattern Recognition (IAPR). At present, she the "Human face based on photo-portraits of methods and algorithms for the recognition of racial identity" is engaged in scientific research on the subject

Bayramova Tamilla senior researcher at the Institute of Information Technologies of ANAS. Her research interest include software engineering