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Problem of software development process standardization — comparing CIS and CEE regions

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Abstract. This article is dedicated to overview historical and modern aspects of standardization of software development process models in IT companies in two regions — CIS and CEE. Regions had a similar starting point in middle of 90-th and impressive attempt of world-wide competition in export software development in beginning of new century. Different economic factors in those regions didn't allow companies from both regions achieve any great results. In article are observed current situation with CMMI certification and world-wide competition in software domain. One of the key resumes of article is future demand on software development standardization even on such markets like CIS and CEE, where current request on certification is very low. It connected with future type of competition in global software market.
Keywords: software production improvement, software companies certification, CMMI in CEE- and CIS-regions.

Проблемы разработки программного обеспечения процесса стандартизации: сравнение проблем регионов СНГ и ЦВЕ

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Аннотация. Данная статья описывает историческое развитие и современные аспекты стандартизации процессных моделей ИТ-компаний в двух регионах — СНГ и Центральной и Восточной Европе (ЦВЕ). Регионы имеют схожую историю ИТ-развития, включая его начало в середине 1990-х гг. и попытку вхождения на мировой рынок экспортного программирования в начале XXI в. Различные экономические факторы не позволили компаниям обоих регионов достичь значительных результатов. Одним из ключевых выводов статьи является необходимость стандартизации производства программного обеспечения в таких регионах, как СНГ и ЦВЕ, в будущем. Это связано с особенностями конкурентной борьбы на глобальном софтверном рынке.
Ключевые слова: модернизация процессов разработки ПО, сертификация ИТ-компаний, CMMI-стандарт в регионах СНГ и ЦВЕ.

Introduction and history overview

Global geopolitical and economical changes in Central and Eastern Europe (CEE) in beginning of 90-th of last century coincided with first world-wide academic attempts of application software industry standardization. Different Institutions (like Software Engineering Institution or ISO/IEC Organization) or leaders of software product market (like IBM, Microsoft, Borland) presented their standards and production process models, what could be used in hundreds software companies. Without a doubts it's could be used not only in a military or astronautic programs with their gigantic project teams.

Impetuous growing of automation of different business areas and personal computer's (PC) price reducing gave to Central and Eastern Europe, including

CIS-region, a huge impulse for establishing of hundreds of software companies in different European countries. Organization of software production required clear understanding of the whole life-cycle of software product development; meanwhile, class of business application software for PC was almost a new-born. And only few business directions (like banking or tourism) had an experience of implementation and excellence of application software during dozen years from mainframes and mini-computers times.

Meantime, during 90-th almost all new big software companies in CEE-region copied their production models from leaders of the markets from USA, adding modern recommendations from CMMI or RUP standards (promoted and supported by big market players from USA). Common European market and strong business and IT connections with USA and Japan defined the set of needs for new software companies including standardization of software development according CMM model. Transnational corporation came in Central Europe in the end of 80-th, but on the first stage of 90-th software market development needs of local business in CEE region were covered by local software houses. Especially it was right for domain with national features and legal restriction like banking or HR management [1,2].

IT companies from CIS region during long-long time from the personal computer's boom of 90-th didn't paid any attention to following standards, that were born in USA and were slowly appearing in Russia and Ukraine. Certainly, there were several IT companies (outsource type), who used elements of CMM standards from the early of 90-th [3], but the big part of the companies used their own standards and processes models in development. On the other hand an economic difficulty in CIS-countries, language barrier and lack of technological recourses and even personal computers partly excuses this reckless. Offices of global business corporation (like Coca-Cola or McDonald's) in Russia or Ukraine used their own software; local business didn't know anything about modern level of software quality and couldn't request this level of services and products from the local vendors.

Meanwhile, global software leaders preferred to hire local specialists for relocation in USA or Canada instead of establishing big research or software development centers (for example, like it was in India at the same period). Thus local new-born software companies supported local business areas (banking, management of HR, accounting, hotel and transport services) to some extent, but high quality level of products were not expected by customers. This factor, local regulations and language barrier gave to many CIS software company an illusion that current level of software quality and current production process models could be comparable during many years.

At the end of 90-th market of software development became international and global. Several countries increased significantly this IT sector of economic: India from 1990 to 2000 in 38 times [4], China started later but reached a big result (from 1993 to 2000 in 14 times [5]). For understanding the global situation in this key historical point of export software industry completion let's define some numbers here. At the 2000 India had a software market in 5.7 billion USD, 12 years of focused government's industry support. National Indian's survey in 2000 indicates that more than 185 of Fortune-500 companies, i. e., almost two out of every five global giants, outsourced their software requirements to India during 1999–2000. At the same period China's software export has been tripled during 1999–2001, reaching about 750 million USD. At that time researchers evaluated China as a country with huge export software development [6] primary due to complex set of government measurements like infrastructure construction, legal system, etc. At 2001 more than 400 k engineers were employed in software domain.

CEE-region market also grew, for example in Poland in 90-th IT market increased in 40% for the year [7]. First of all it was a time of outsource software development, when companies and development centers were resolving tasks for the clients even from another continent. Global cooperation required another level of services and software quality, based on international standard and allows talk with customer on the same language. There was next big wave of certifications of software companies in Europe, especially in Central and Eastern Europe countries, that consolidated enough big margin of safety on local markets and were ready for international expansion. For example, in period of 1999–2002 Czech Republic became a global leader in quantity of ISO certification for IT companies [8].

Meanwhile, in the beginning of current century leading software companies (including new branches of well-known local system integrators) from CIS region started an outsourcing services expansion, which required international valued proofs of production quality. USA market orientation means direct interest to CMM (CMMI) standards. Several companies (future local leaders in offshore and outsource software development) became certificated in 2003–2005. Luxsoft

reached CMMI L5 in 2003, EPAM Systems reached CMMI L4 in 2003; E-style SH became certificated at CMM L3 in 2003 and Softline from Kiev reached CMMI L3 in middle of 2005. At the same period all of them (and much of their local competitors) got ISO certification. For CIS-region software companies it was a start point in world-wide competition and result of software export in Russia in 2002 was about 345 million USD (in 16 times less then result of India in 2000). After 20 years we may see that GAP between Russia and leaders of export software development (India and Chine) is insuperable.

Thus, at the middle of 2000-th all current leaders from the local markets became certificated in CMMI and\or ISO standards. No doubts that at the same period were built all international connections in format «Customer-Contractor» between companies and industry segments from USA, Western Europe, Eastern Europe, India and Chine.

Current situation

Last years from 2012 shows unstable global trends for software industry in CIS region and Russia as a main software player in this region [9, 10]. At any case only few CIS companies (and only from Russia) are world-wide well-known and presented in global ratings (The 100 Global Outsourcing, Software 500, FinTech 100, etc). According mentioned above reports export of software development reached 5.4 billion USD in 2013 (result of India in 2000) and the cumulative turnover of Russian software companies reached 11 billion USD. Meanwhile, sales of Russian software companies only in the Russian market amounted to 5.6 billion USD. In addition, minimum 3 billion USD is accounted for by foreign vendors (such as Microsoft, SAP, Oracle, IBM and many others).

Economic crises in Belorussia (2013), Ukraine (2014), Russia (2015) would not add any positive impulse for development of IT industry.

On the other hand software companies from countries of CEE regions keeps their local positions in some traditional automation areas, where language barrier or government regulation is enough strong. But the dominant part of business software on European market is built by global software companies (mostly from USA) and huge share of engineers is working in international developing centers. Companies from CEE didn't become huge exporters of software services. Thus Hungary became a leader in CEE region with whole IT export in 1,3 billion USD in 2013 [11] and software export market volumed in 0,45 billion Euro. But in 2015 there is only one of TOP-10 Hungarian software companies is originally Hungarian (after acquisition of IND Group in 2014 by MISYS).

Another IT player in region market — Czech Republic had the most matured IT market and its value reached 4 billion USD in 2011. And Poland, another fast growing IT market, has a value in 8 billion USD.

Meanwhile, shares and turnover of Indian and Chinese software companies in 2010–2015 rapidly growing and now in 10 times higher than in whole CEE and CIS regions. Close connections with USA, Singapore, Western Europe markets and huge investments of international companies and local government gave a big impulse; moreover, internal software market is rapidly growing [12] and Chine even in 2012 was a biggest market in Asia\ Pacific.

Of course, financial results of each company and industry at all strongly depend on common level of software quality, which became one of the most significant competitive advantages. According dozen of studies, including author's one [13], quality of software directly depends of production processes unification and standardization. Different regions on the different stages entered in world-wide competition in software business and exactly share of international project defines certification's needs and its support from national IT community and special government program. Chine and India have a national program of support IT business and software company's certification for dozens of years. New players from Latin America are coming now on the global software export market and demonstrating very fast software market growing.

Let's define how one of the most recognized industry standard model — CMMI — is demanded in CIS and CEE regions. Data about valid CMMI certification are presented in Table 1.

Practically we may see that even Chile with population 17,2 mln and only one city with population more than 2 mln people has a much more advanced export software market, where global customer's expectations met certificated development process models in vendors and guaranteed quality of software products. Also Chile is demonstrating rapid growing of software production (in 2010–2014 from 10 to 15% for year) and became a leader in Latin America [15]. For comparing in Russia turnover of local leaders and production of software is changing in 1–3% — sometimes it's falling, sometimes it's increasing [8,9].

According [13] IT managers from CIS region do not see a strong connection between software company certification and its commercial success. Probably it

Table 1

CMMI certificated software vendors in different countries. Data is taken from official CMMI network [14]

№	Country	Quantity of valid certifications CMMI (2012–2015)	Comments
1	CIS region		
1.1	Russia	6	2 companies from 6 are local offices of global foreign corporation
1.2	Ukraine	3	All certificated companies are local offices of global foreign corporation
1.3	Belarus	2	One certificated company is an local offices of global foreign corporation
1.4	Kazakhstan	1	One certificated company is an local offices of global foreign corporation
2	CEE region		
2.1	Hungary	3	2 companies from 3 are local offices of global foreign corporation
2.2	Czech Republic	2	One certificated company is an local offices of global foreign corporation
2.3	Poland	10	9 companies from 10 are local offices of global foreign corporation
2.4	Romania	4	All certificated companies are local offices of global foreign corporation
3	Different countries for comparing		
3.1	China	Around 100	The fastest growing of CMMI certification in software industry for last 2 years.
3.2	India	Around 100	Most of Level 5 (the highest level) software companies in the world.
3.3	Argentina	26	16 companies from 26 are local offices of global foreign corporation despite of total economic break with USA market
3.4	Chile	26	18 companies from 26 are local offices of global foreign corporation.

is a consequence of formed internal IT market, where customers do not associate high quality of software product with maturity and sophistication of production processes, proofed by official certificates. But focusing on local market and lack of attention on software quality closed for CEE and CIS software companies opportunities of word-wide expansion.

In CEE-region and all CIS-countries there are only 3 official appraisal partners of SEI (organization of CMMI process standards) and only one of them is officially taking part in appraisal projects in CIS area (Estonia, Russia, Ukraine, Kazakhstan, etc). It shows a very low level of interest from CIS software companies to CMMI certification and formal meeting with requirements of global customers.

In Central Europe almost all software companies with CMMI certificates are parts of global IT corporations. National leaders aren't going in international competition anymore and focused only on local markets.

Resume

History of IT domain development in CEE and CIS strictly demonstrate: both regions were at the same level of IT process maturity at the middle of 90-th and local companies had tried to win the market of outsource software development in beginning of new century. It was a big impulse for official certification and unification of software development process models that could support high level of software products quality.

CIS and CEE regions have different human potential: Russia and Ukraine had much more technological universities and graduated software professionals during 90-th. From the other hand CEE region was much closer to markets and technologies of Western Europe (WE), including UK. Meanwhile, both regions during 90-th had a strong language barrier with USA and global leaders (IBM, Oracle, CISCO, Intel, etc) didn't have so huge influence on IT business standards on local markets.

At the modern period of competition in software industry (2012–2014) we may see the following results:

In both regions global software companies (mostly originally from USA) took domination position in all segments of software (system, business, consumer, etc).

Close connections of CEE and WE led to acquisition of the most national software leaders. These processes are still continuing and now merging processes are going even in very niche areas.

CIS countries saved their national leaders in different segments, but their business interest mostly spreads on Russian language region and 3-rd world countries.

Internal software market in Russia is very huge, that helps a lot of companies feel yourself comfortable and they don't need any official certifications.

Situation in India, China and even Chile shows that opportunity of rapid software export growing was lost for CEE region and for CIS region as well. We may notice some successes on country-size markets and even growing in some areas in more than 10%, but those countries would never reach the results of India or Chine, who invested a lot of resources in export software market. By the way now growing internal market strongly supports its IT industry.

From the other hand globalization of the software market became a reality more than 10 years ago. Global software corporations have many centers of development on different continents, projects are executing by distributed teams, and one certification in IT area now covers different company's offices in different countries. Globalization of the branch, connected with eliminating of almost all borders — language, mental, political — in future would decrease a significant part of noticed problems in this article. In next 20 years almost all middle and big-size software companies became multi-language and would operate in many countries simultaneously. It means that standardized production processes would be in demand as an additional argument in competition even in regions, where it's not a primary argument today.

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