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SME DEVELOPMENT AND DCFTA IN GEORGIA Project



Georgian ICT Cluster Potential:

**Strengths, Weaknesses and
Internationalization Opportunities**

June 2017

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Executive Summary

Executive Summary

1. There is a nascent ICT community in Georgia, which is ready to take advantage of its strengths and existing opportunities to reach EU markets.
2. It is impeded by a lack of managerial and soft skills (Project and organizational management, business analytics, market intelligence, marketing, etc.).
3. This can be addressed through expert advisory and cluster development, starting with the existing ICT cluster in Tbilisi, and preparing similar activities in other ICT centers in Georgia, e.g. Batumi.
4. Both market-driven and regulation-driven developments in the EU markets open significant opportunities for Georgian ICT companies to export both 'more-of-the-same', as well as new products (with the smaller size of Georgian companies, in certain cases, poised as a competitive advantage).

Recommendations for action:

1. **Cluster formation:** Initiate cluster formation – promote linkages and cooperation among companies initially in Tbilisi (Mioni center), and in the mid to long term other ICT centers in the country.
2. **Market linkages and partnerships:** Develop and outline an action plan to create market linkages and partnership opportunities with well-known regional and international IT clusters.
3. **Skills Development** by offering trainings and technical assistance to:
 - a. Enhance project management and business analytics skills, overall corporate culture
 - b. Enhance companies' sales force and their capacities
4. **Facilitate access to markets via internationalization** by scoping market opportunities to tap into
 - a. Eastern Europe – ready for business solutions for financial and government institutions.
 - b. Western Europe – innovative solutions for businesses (manufacturing)
 - c. Position as a hub in South Caucasus Region (off-set Armenian technical advantage via business environment and access to EU market)
 - d. “Endless” mobile application industry (USD 77 billion industry, grows annually at 25%) and website industry (EUR 25 billion industry)
 - e. Teaching companies to focus on smart, simple and cost-effective solutions to counter inflexibility of industry giants
5. **Promote Private-Public Dialogue**
 - a. Enhance ability of companies to advocate for necessary regulatory and/or policy changes through a formal cluster organization;
6. **Support Enterprises in Export Development:** taking advantages of tendencies in EU markets allows not only to export existing products in portfolio of Georgian companies (“Export Promotion”), but also to develop and sell new offerings to the markets (“Export Development”).

Introduction

A. Goals and Targets of the Assessment

The objective of this assessment and evaluation of the ICT sector in Georgia was to evaluate the current operating conditions, key growth constraints, and opportunities to create synergies through cluster development. Specifically, the assessment was to first identify the current financial, technological, and institutional positions of companies operating in the ICT sector. Additionally, the assessment identified the products and services offered by companies for assessing the export potential of the sector. Further, the assessment uncovered the key challenges related to growth and expansion faced by firms within this sector while identifying the needs firms have in order to develop their capacity to respond to these challenges.

The conclusions and recommendations resulting from this assessment will indicate the ICT sector's prerequisites for exporting its products and services, while also providing the EU Delegation in Tbilisi, the Government of Georgia and GIZ with a more comprehensive understanding of how the "SME Development and DCFTA in Georgia" project can target its future development activities to support the growth and increased competitiveness of this sector.

B. Assessment Methodology

The assessment team conducted both qualitative and quantitative analyses. Specifically, the assessment team conducted a survey of ICT firms, representatives of the Government of Georgia (GoG), and donor organizations through 35 key informant interviews.¹ The assessment team developed a customized questionnaire for these interviews that provided our team flexibility to develop a clear understanding of the interviewee's perspectives and to gather in-depth insights through a combination of formal and information discussions that also explore topics of interest to the interviewee related to the evaluation more deeply.

Based on the findings from these interviews, the assessment team conducted a needs assessment and SWOT analyses on four segments of the information-technology sub-sector that demonstrated substantial potential for development to assess their strength, weaknesses, and growth opportunities, as well as their potential competitiveness on the domestic and international markets.

To complement this qualitative analysis, the assessment team also conducted extensive quantitative analysis on available statistics related to the demand for the ICT sector's products and services, market penetration of internet usage among the Georgian population and the business sector, and the utilization of specific technologies.

Unfortunately, only statistics on the revenues and subscription rates of the "communications" sub-sector (e.g., mobile, internet, television and radio broadcasting) were readily available. Statistics for the "information technology" sub-sector (e.g., software and mobile application development, electronics and hardware, software sales and integration, support, and IT services) were not either nonexistent or very limited. However, the communications sub-sector serves as an enabling mechanism for the development of new products and services within the information-technology sub-sector, as well as a distribution platform for those same products and services. Therefore, trends in growth and innovation within the communications sub-sector can serve as an indicator for the potential development and expansion of product and service offerings and for the development of new markets as communications platform further penetrate the consumer base.

Part 1: Assessment of the ICT Sector in Georgia

A. ICT Sector Profile

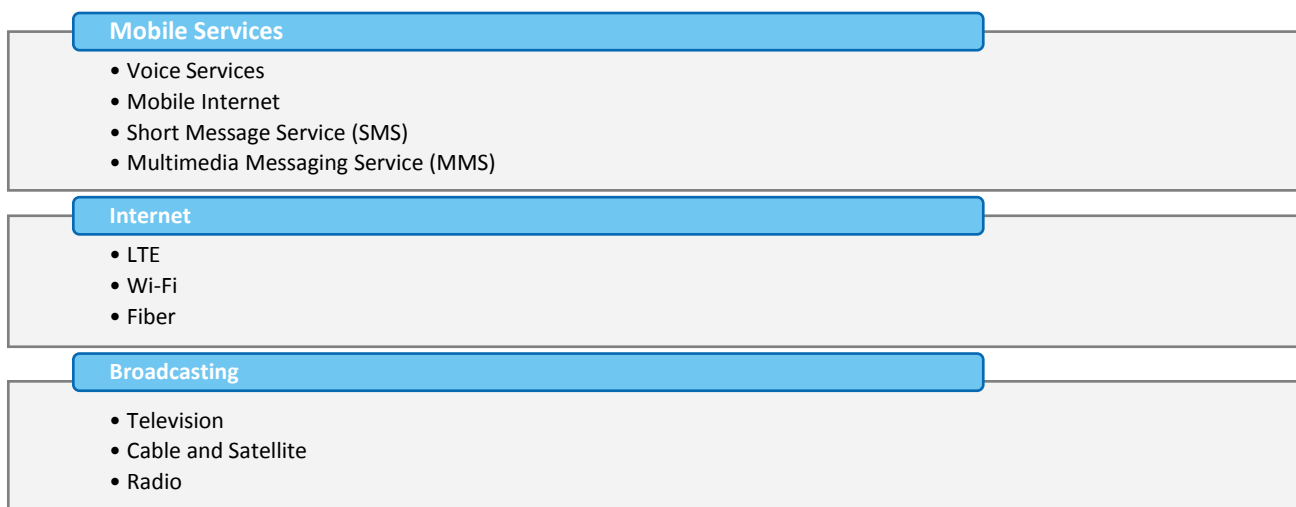
Supply Analysis

The communications sub-sector is relatively mature, with six mobile phone and mobile internet service providers, 17 large internet service providers with revenues over GEL 500,000 and 118 smaller internet service providers, 15 large television broadcasters with revenues over GEL 500,000 and 57 smaller

¹ For a complete list of firms interviewed, see Annex 2.

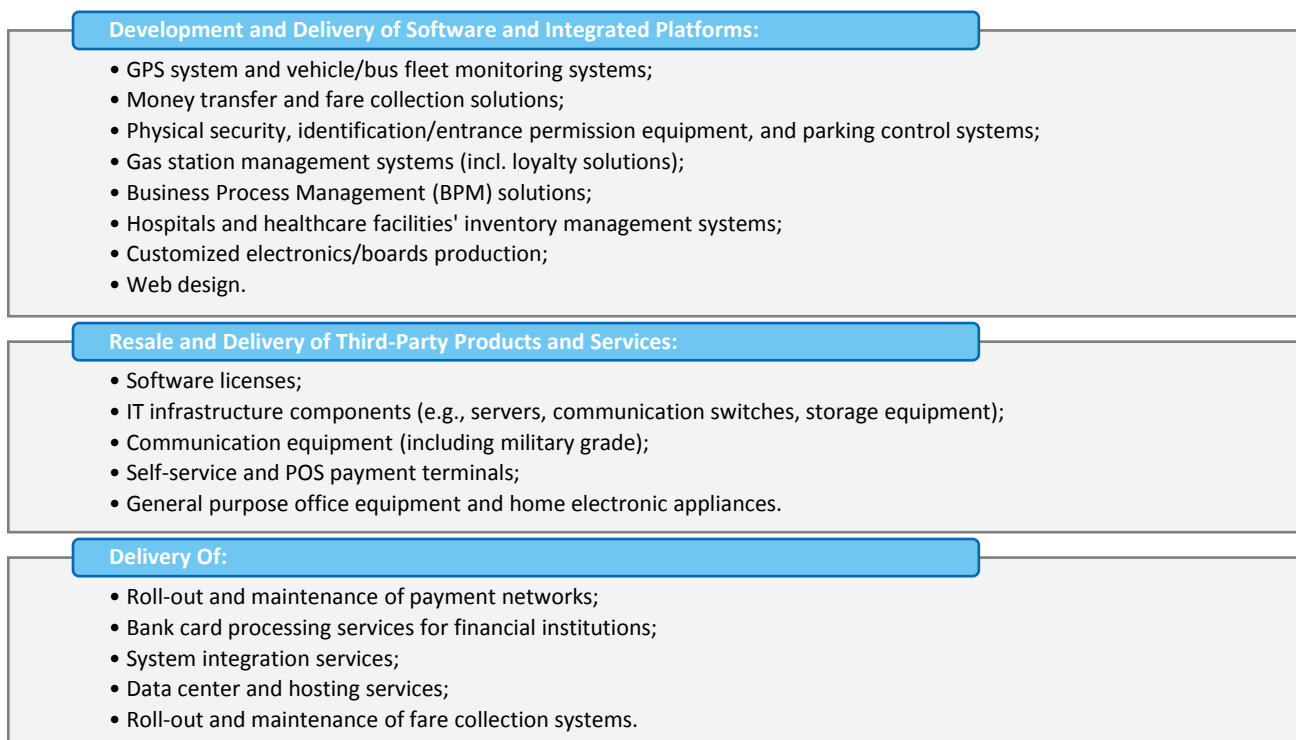
television broadcasters, and 6 large radio broadcasters with revenues over GEL 500,000 and 32 smaller radio broadcasters.²

Figure 1 - Products and Services Offered by the Communications Sub-Sector



Due to the lack of reliable statistics on the information-technology sub-sector and the characteristically small size of many firms in this sub-sector, it is not possible to estimate the number of firms providing products and services (e.g., software and mobile application development, electronics and hardware, software sales and integration, support, and IT services) in the market.

Figure 2 - Products and Services Offered by the Information-Technology Sub-Sector



² Georgian National Communication Commission website, Analytical Portal, <https://analytics.gncc.ge/en/>.

Demand Analysis

Similarly, due to the aforementioned lack of statistics on the information-technology sub-sector, it is difficult to estimate the current operating and financial performance and to forecast growth trends related to the demand for key Segments within this subsector. However, based on survey results of firms operating with this sub-sector

- **DEMAND:** their revenue reach up to USD 70 millions. As for the rest of respondents average annual turnovers varies from USD 500,000 – 1,000,000.

These results are supported by the trends in growth and innovation found within the communication sub-sector, which represents an enabling mechanism for the development of new products and services within the information-technology sub-sector, as well as a distribution platform for those same products and services. In fact, while there has been only slow growth in overall retail revenues for the communication sub-sector, equivalent to 1.4% compound annual growth rate (CAGR) from 2010 to 2016, revenues are shifting in favor of more innovative technologies. Specifically, revenues for fixed telephone services have dropped sharply since 2010, for a total decrease of GEL 70.7 million, while revenues for internet services have increased GEL 120.2 million. Similarly, television and radio broadcasting, which represent strong markets for the information-technology sub-sector, have also experienced a 6-year CAGR of 12.5% and 7.6%, respectively.

Figure 3 - Retail Revenues for the Communications Sub-Sector

Figures in GEL	2010	2011	2012	2013	2014	2015	2016
Multichannel TV	7,399,703	19,065,976	30,078,393	45,932,239	49,153,886	57,503,922	65,938,387
Internet	75,489,726	99,380,188	114,950,787	134,095,708	160,001,990	185,161,408	195,693,218
Mobile (All)	532,514,202	440,658,561	460,384,098	455,010,169	455,019,843	407,073,739	418,297,696
TV Broadcasting	70,560,832	79,842,886	82,611,922	74,880,427	94,609,174	84,963,182	143,129,642
Radio Broadcasting	8,085,429	9,818,258	9,613,290	9,371,650	9,737,697	13,241,577	12,551,649
Fixed	120,995,879	109,557,800	96,075,325	80,238,569	70,436,800	57,051,268	50,274,186
Total	815,045,772	758,323,669	793,713,816	799,528,762	838,959,390	804,995,095	885,884,778
<i>Annual Growth</i>	-	(7.0%)	4.7%	0.7%	4.9%	(4.0%)	10.0%

Given that the market is dominated by mobile services (representing 47.2% of retail revenues), identifying emerging trends provides an indication of the potential for innovative technologies. Specifically, based on an analysis of data provided by the Georgian National Communication Commission (GNCC), revenues for mobile internet are growing rapidly at 19.7% CAGR since 2010, for a total increase of 193.9%. Additionally, mobile phone voice service usage is increasing, as indicated by the annual number of calls made; however, revenues have decreased 8.8% CAGR since 2010 due to lower prices paid by consumers. While this trend suggests that the mobile voice service providers are providing the same service at lower costs, the overall decrease in revenues also coincides with the introduction of monthly packages (phone/internet/SMS) and increased market competition in the sector, as well as the widespread adoption of alternative communication platforms (i.e., Viber, Skype, WhatsApp) as internet access increases for consumers.

Figure 4 - Revenue Analysis for Mobile Phone Services

Figures in GEL	2010	2011	2012	2013	2014	2015	2016
Internet	25,989,018	31,480,513	38,240,748	40,648,533	51,074,243	60,716,833	76,372,342
- Standard	21,968,175	26,042,169	31,994,592	33,510,217	45,092,924	57,156,959	74,025,024
- HSPA/EVDO	4,020,843	5,438,344	6,246,156	7,138,316	5,981,319	3,559,874	2,347,318
Phone	382,136,694	336,405,494	344,922,009	335,516,858	318,931,319	250,396,436	219,445,561

SMS	48,969,308	40,809,213	42,501,309	42,104,946	34,809,660	27,815,216	21,102,607
MMS	673,598	406,673	276,353	204,415	151,683	49,601	40,708
Number of Calls	3.65 billion	4.09 billion	4.56 billion	5.00 billion	5.34 billion	5.58 billion	6.09 billion
Revenue per Call	0.1048	0.0823	0.0757	0.0671	0.0597	0.0449	0.0360

Similarly, non-mobile internet subscriptions have increased from 813,645 in 2010 to 2.5 million in 2016, representing a 20.7% CAGR. As indicated in the following table, old technology (e.g., dial-up internet, ethernet) have already been phased out completely due to lack of demand in 2013, replaced by more innovative technologies. Innovative, modern technologies dominate the internet (total market share for LTE, wi-fi, fiber, and xDSL is 99.3% of the market) with fiber at 57.3% of subscribers and xDSL at 21.6%. This trend is expected to continue, as xDSL peaked in 2013 and has declined by 31.2% over the past 3 years.

Figure 5 - Internet Subscribers, by Technology

Number of Subscribers	2010	2011	2012	2013	2014	2015	2016
LTE	-	-	-	-	154	13,421	33,824
Wi-Fi	915	6,224	17,718	43,014	68,664	77,449	110,151
Fiber	87,464	127,427	184,109	246,914	314,088	361,769	402,697
xDSL	167,337	201,936	214,188	220,161	210,734	179,844	151,519
Canopy	396	314	360	431	693	921	754
Satellite	11	6	22	57	49	47	27
CDMA	20,602	20,213	10,278	11,870	11,793	7,189	3,560
WiMAX	5,163	7,540	8,808	10,868	7,164	2,193	490
Dial-Up	227	26	3	6	1	1	1
Ethernet	36	83	168	-	-	-	-
DOCSIS	385	355	-	-	-	-	-
Leased Lines	16	36	42	-	-	-	-
Total	282,552	364,160	435,696	533,321	613,340	642,834	703,023
<i>Annual Growth</i>	-	28.9%	19.6%	22.4%	15.0%	4.8%	9.4%

According to GeoStat, the National Statistics Office of Georgia, the level of market penetration for internet usage for January 2016 averaged 70.7%, with urban areas averaging 79.7% and rural areas 57.4%. Given that many products and services offered by the information-technology sub-sector require some type of network technology and connectivity, geographical areas of higher market penetration, which also have larger populations, would represent more attractive markets for firms in this sub-sector.

Figure 6 - Internet Usage Market Penetration Rates for January 2016

Region	% Using the Internet
Tbilisi	84.3
Adjara	75.9
Samtskhe-Javakheti	68.2
Kvemo Kartli	66.0
Samegrelo - Zemo Svaneti	62.1
Imereti, Racha-Lechkhumi and Kvemo Svaneti	59.0
Shida Kartli	57.8
Mtskheta-Mtianeti	56.7
Kakheti	54.8
Guria	50.5

Although individual consumers are the primary market for many products and services within the information-technology sub-sector, other firms target enterprises that more often purchase 3rd-party software and technology solutions instead of developing them internally through Research and Development (RandD). Specifically, of all firms in Georgia that made “investments in innovation” (e.g., software, mobile applications, integrated platforms, portable computers, smartphones, design, trainings) in 2013-15, only 12.1% developed the solutions through in-house RandD and only 5% through external RandD. However, 50.1% either acquired the innovative technologies (e.g., software, machinery, equipment, knowledge, training) from external service providers.³

Based on GeoStat survey data, the level of internet usage by enterprises in January 2016 was 97.5%, with 39.7% utilizing fiber optics, 31.2% utilizing DSL (e.g., xDSL, ADSL, etc.), and 17.2% utilizing mobile broadband connections while dial-up access represented only 0.5% of enterprises. This further supports the shift in consumer/corporate demand towards more innovative technologies over older technologies.

B. Analysis of Current Capacities and Technical Knowledge

Needs Assessment

Given the level of market development, the number of companies generating revenues over GEL 500,0000, and the size of the communications sub-sector being about GEL 885.9 million, the needs assessment focused primarily on the information-technology sub-sector as it appears to be significantly less developed, dominated by only a few large firms and many small entrepreneurs. This is line with the GoG’s strategy to develop the information-technology sub-sector, as evidenced by the establishment of Georgia’s Innovation and Technology Agency (GITA) in February 2014, a GoG agency tasked “to coordinate and mediate...ensure the achievement of the tasks facing the country and contribute to innovation and technological development”.⁴

While conducting the key informant interviews, the assessment team interviewed company executives (primarily Chief Executive Officers/General Directors) from 25 firms operating in the information-technology subsector to collect data on the following characteristics:

- Products and services offered;
- Level of the firm’s maturity/institutional development (e.g., years of operations, shareholding structure, presence of a management information system, operational procedures, policy structure);
- Size of the company and annual sales (e.g., number of staff, management and organizational structure, staff by unit [e.g., administrative, engineering], annual sales and financial data);
- Activities related to marketing, sales support, and promotional (e.g., corporate/product presentations, websites, participation in exhibitions and conferences);
- Key challenges and threats to business development and opportunities for growth

The following results and conclusions are based on interview responses, which have been integrated with external data and validated by the assessment team’s experience and knowledge of the sector. Key responses regarding firms’ “top challenge” related to their company needs for growth are summarized in the table below. A critical observation that supports the development of collaborative structures like

³ GeoStat website, “Enterprise Engagement In Innovation Activities”, http://geostat.ge/cms/site_images/files/english/ict/innovation/7.%20Distribution%20of%20enterprises%20by%20enterprise%20engagement%20in%20innovation%20activities.xlsx.

⁴ GITA website, “About GITA”, <http://gita.gov.ge/en/agency/about-gita>.

business clusters within this sub-sector is that none of the respondents stated their greatest challenge is from a high level of competition from other firms, except only as it was related to the retention of staff.

Figure 7 - Greatest Challenges of Information-Technology Sub-Sector Firms for Growth

Challenge	Response
Limited market size, sales, lack of sales force	32%
Lack of elementary technology production services	20%
Lack of qualified staff	16%
Limited experience in international markets	8%

General findings of the assessment:

Limited market size, sales, and marketing: 32% of executives mentioned as one of the biggest challenges for company growth is the limited size of the Georgian market and the ability to pay for products and services.

Lack of sales force: Most of the companies interviewed do not have a strong sales force or marketing department which affects ability of companies to increase their sales.

Hardware production facilities: 20% of executives mentioned it is difficult or impossible to find a small-scale producer able to manufacture a prototype. This is extremely important for hardware producers as currently there is only one producer of motherboards with outdated equipment whose able to produce either small amount and assist in developing a prototype for a new project. In addition, to general lack of professional staff, it is even harder to hire a professional for hardware production.

Lack of qualified staff: 16% of top managers stated that the lack of qualified staff as on one the reasons limiting faster growth of companies. In addition, due to fierce competition for qualified staff the companies find it hard to retain the top performers.

Limited experience in international markets: Only three respondents had experience working with international partners. The majority of the respondents stated an access to international markets as one of top priorities and challenges at the same time. As it was stated during interviews, the respondents have very limited or no market intelligence (e.g., customer base, regulations, etc.) on other markets.

Access to finance: Access to Seed Financing remains one of the challenges for ICT firms, especially startups. The local investors are not (used to) this type of financing, and start-ups are struggling to gain attention of international plyers. However, the introduction of Start-up Georgia project by GoG will, possibly, affect number of local seed investors.

Export Potential SWOT Analyses

To provide a deeper understanding of the competitive context governing the activities of firms in the information-technology sub-sector and to evaluate their export potential (particularly for firms currently operating in clusters and/or partnerships), the assessment team conducted SWOT analyses on four segments of the information-technology sub-sector that demonstrated substantial potential for development to assess their strength, weaknesses, and growth opportunities, as well as their potential competitiveness on the domestic and international markets. These sectors include:

1. Business software;
2. Equipment, electronics, and hardware;

3. General-purpose software;
4. Integration, SAAS/PAAS, reselling, support, and other IT services.⁵

Hardware		Software	
Strengths	Weaknesses	Strengths	Weaknesses
<p>Flexibility in fitting customer requirements: All equipment and software are developed by single vendor, so can be easily changed, updated or modified up to end-user needs.</p> <p>Low costs of development – in comparison with similar or same-purpose products by well-known brands – local products are substantially cheap.</p>	<p>Quality of production – there is a lack of good production facilities in the country – 20% of respondents mentioned, that there is a scarcity of professionals and equipment of metal and plastic processing, pick and place machines to produce electronics (boards, components) CAD studios and companies etc.</p> <p>Scale of production – considering most of the solution are “tailored” and “hand-made” – local facilities aren’t adopted to large-scale production.</p>	<p>Products mostly based on up to date technology</p> <p>Flexibility and low cost of the product</p> <p>Maximum consideration of business stakeholders’ requirements. Highly flexible approach of developer teams and readiness to adopt, upgrade, change the systems to fit the business/regulatory requirements.</p> <p>Agile-style in development, short timeframes from idea/order to go-live (80% of respondent mentioned time and flexibility is a key issue for success on local market);</p> <p>Considerably low costs of development (most companies managing to keep developers’ salaries within the range of EUR 400-2,000 per month, with the average being EUR 1,000.</p>	<p>Lack of corporate culture, high staff turn-over makes difficult to manage project and maintain products.</p> <p>Quality – lack of overall experience causes architectural drawbacks of the software, capacity and/or security problems</p> <p>“As Is” approach – Mostly business software is developed with minimal changes in an existing work-flow. Very often such systems are just “hard-coded” replication of existing business processes of various entities, rather to be an optimized solution considering a wide range of sector/industry experience and/or challenges.</p> <p>Lack of initial business analytics component - Very often while developing business software, vendors as well as customers are targeting operations rather than overall business process. Nobody keeps a big picture and outcome is – not an optimized system, but a sum of “wish lists” of representatives of different departments like accounting/financial, marketing. Actually, it is a case when business requirements defined by line rather than business managers (at least 45% of respondents mentioned, that customers don’t know “what they really need” and “we’ve better understanding of what happens at customer’s business”).</p> <p>Solution Architecture - Strategic/high-level requirement analysis, structures, Data models, Selection of platforms, methodology, scalability, fault tolerance, security and backward compatibility, other architectural components very often aren’t a subject of proper attention/investigation. Rarely business-owners understand the importance of those issues and not very often IT companies have an internal corporate culture and knowledge to properly figure out solution architecture.</p> <p>Poor project management – Lack of project managers who have a good enough knowledge in the field and proper understanding of basics of the IT engineering causes problems in business/IT or customer/vendor communication and leads to schedule breaches, overdue tasks and costs</p>

⁵ For specific SWOT analyses on each of these segments, see Annex 1.

overrun.

Code quality, documentation, testing –

Due to high sensitivity of customers to IT solution vendors flexibility, costs and timeframes, Companies are mostly oriented to deliver works as fast as possible, often at cost of product quality, especially its components “hidden” for customer/end user e.g. Code quality (structure, comments, variable names, platform independence), Technical documentation – clear and up to date description of modules, their functionality, detailed description of protocols used etc. Testing process often is not duly distinguished from development. (in at least 60% of cases companies don't have dedicated testers).

Part 2: ICT Sector Visibility on Domestic and International Markets

C. Competitive Advantages and Disadvantages of ICT Products and Services

Georgia ranks 58 in the World Economic Forum Networked Readiness Index, which puts the country right behind its closest neighbors Armenia & Azerbaijan.

	Score	Rank (/139)
Georgia	4.25	58
Armenia	4.27	56
Azerbaijan	4.31	53

Georgia	Score	Rank (/139)
Overall	4.25	58
Environmental subindex	4.12	56
Readiness subindex	5.3	46
Usage subindex	3.84	72
Impact subindex	3.76	63

Based on the assessment team's survey results, over 90% of ICT firms' clients are Georgian, and they mostly represent banking, government, retail industries. The respondents (65%) stated that their development strategy is export oriented and recognize the importance of visibility (marketing activities) of Georgian companies on international markets. However, when asked about participation in international fairs and exhibitions, only few had that experience. Therefore, the overall visibility of Georgian ICT firms in international markets is very limited.

Target ICT Services for Domestic and International Market

Considering the limited size of the local market it is natural for Georgian ICT firms to explore and consider expanding into other markets, particularly within the region where there is a cultural and historical relationship that can be leveraged to enter the market and develop partnerships. Based on the capacity of Georgian firms there are two main directions that could be explored:

- Eastern Europe – ready for business solutions for financial and government institutions.
- Western Europe – innovative solutions for businesses (manufacturing)
- South Caucasus Region – Georgia as a country has a potential to become a regional ICT hub and the regional market could become one of the targets for ICT companies.

Recommendations

General Recommendations

Based on the conclusions of these analyses, the assessment team developed actionable recommendations related to developing the internal capacity of firms in the sector and for GIZ to target future interventions to directly address the challenges faced by firms in the sector.

- Assist the current Mioni Cluster's administration to perpetrate organizational and other steps to increase the interaction of the cluster companies and, in doing so, provide additional benefits for participating companies (e.g., organization of shared work spaces, show room, launch of commission-based services to promote companies' products internally and on national/foreign markets etc.);
- Develop and outline an action plan to create market linkages and partnership opportunities with well-known regional and international IT clusters to develop companies export capabilities and encourage the Mioni Cluster's expansion;
- Based on the identified challenges, develop a mixed plan of training and technical assistance for management-related issues to address the key problems faced by the companies to enable them to increase their revenues (including revenues from export) and institutional development.

Part 3: Stakeholder Analysis and ICT Cluster Development

A. Stakeholder Mapping

Stakeholder Map

International Organizations

Considering importance of ICT for country's development, currently several international organizations are conducting activities to support ICT development in Georgia (in addition to a potential project managed by GIZ). The major programs are the following

Organization	Activity/project
World Bank/IFC	Needs & skills assessment
G4G/USAID	ICT Sector assessment
EBRD	SME financing and Business Advisory
Millennium Challenge	STEM Project (a joint educational project with San Diego University).

However, aside from the STEM project, the other projects are in their initial stages, and the conclusions and results will not be published until July 2017.

Government of Georgia

The GoG is one of the key players in the ICT sector. By implementing e-government strategy, the GOG boosted the development of many ICT-based services in its agencies. Specifically, the majority of government projects are implemented by in-house IT departments. Below is a list of government entities that are actively involved in ICT development:

GoG Entity	Responsible Body/Activity
Ministry of Justice	Data Exchange Agency
Ministry of Economy	GITA, Produce in Georgia, Start-up Ge
Ministry of Finance	Online Reporting System
Ministry of Education	Education Management Agency
Georgian National Communications Commission	Oversees and monitors Telecommunications Industry
Other government agencies	

Educational Institutions

Based on numerous studies, the presence of a high-quality educational system is one of the preconditions for ICT sector's excellence. There is an existing educational framework for ICT studies; however, currently the quality of education is not sufficient, as stated by interviewees.

Of the 60 higher education institutions⁶ in Georgia, the following are the key ICT-related programs and curricula provided by leading universities:

⁶ <http://mes.gov.ge/content.php?id=1855&lang=geo>

University	Program	Link
Ivane Javakhishvili Tbilisi State University/STEM Program	B.S. Program in Computer Science	http://www.cs.sdsu.edu/ https://www.tsu.ge/data/file_db/quality/Full%20-katalogi.pdf
Georgian Technical University	Bachelors in Informatics	http://gtu.ge/lms/Faculty/Departments/Mas/Docs/Bachelor94.pdf
Free University	Bachelor in Engineering in Informatics (majors: MIS & Computer Engineering)	http://agruni.edu.ge/ge/node/479
Caucasus University/Caucasus Technology School	Bachelor in Engineering in Informatics Software Development, Game Development, Computer Networks & Systems	http://cu.edu.ge/ka/schoolss/cst/programs-cst/bachelor-cst/informatics-bachelor
Ilia University/STEM Program	B.S. Program in Computer Science	https://iliauni.edu.ge/ge/abiturientebistvis/sandiego1/kompiuteruli-injineria
Business & Technology University	Bachelor of Engineering in Informatics	http://btu.ge/images/doc/programs/IT_Pr_Major_curriculum.pdf

In addition to higher education institutions, Vocational Education Training centers (VETs) also offer classes in IT. Below is the list of professional trainings provided by VETs

#	Institution	Profession	Status
1	Opizari	IT Support Specialist	State
2	Black Sea	IT Specialist	State
3	Black Sea	Computer Network & System Admin	State
4	Black Sea	Web Interface Developer	State
5	Shota Meskhia University	Information Technologist	State
6	Shota Meskhia University	Computer Network & System Specialist	State
7	Mermisi	Graphic Designer	State
8	Mermisi	IT Support Specialist	State
9	Prestige	Information Technology	State
10	Prestige	Computer Network & System Technician	State
11	Educational Management Information System	IT Support Specialist	State
12	Educational Management Information System	Network Admin	State
13	Educational Management	Publishing Technical Designer	State

	Information System		
14	Educational Management Information System	3D Graphic Specialist (generalist)	State
15	Educational Management Information System	Web Interface Developer	State
16	Educational Management Information System	Web interface Designer	State
17	Aisis	Network & System Technician	State
18	Tetnuldi	IT Support Specialist	State
19	Modusi	Information Technolgist ?	State
20	Horisone	Network & System Technician	State
21	Spektri	Web specialist	State
22	Spektri	Network & System Technician	State
23	Phazisi	IT Support Specialist	State
24	Akhali Talga	IT Support Specialist	State
25	Akhali Talga	Network Admin	State
26	Akhali Talga	Web Interface Developer	State
27	Iberia	Graphic Designer	State
28	Iberia	ინფორმაციული ტექნოლოგი	State
29	Gldani VET Center	IT Support Specialist	State
30	Gldani VET Center	3D Graphic Specialist (generalist)	State
31	Akaki Tsereteli State University	System Admin	State
32	Batumi Shota Rustaveli State University	Network & System Technician	State
33	Batumi Shota Rustaveli State University	Software Developer	State
34	Telavi Jacob Gogebashvili State University	Information Technology	State
35	Sokhumi state University	Web Interface Developer	State
36	Education	Computer Networks & System Administrator	State

Business Councils

The ICT Business Council of Georgia was established in May 2009 within the framework of the USAID-funded Business Climate Reforms project. The council was established by ten leading ICT companies and more than thirty IT specialists representing governmental organizations, non-governmental organizations (NGOs), and the private business sector. Each of these founders had significant experience in developing the new technologies in the country. The ICT Business Council organizes the Georgian IT Innovations (GITI) conference, an annual event organized by the council is one of the main ICT events in Georgia and South Caucasus Region, focusing on key issues related to the industry, such as Georgian ICT development and cybersecurity.

B. Assessment of Willingness and Efficiency of Potential Cluster Formation

Current ICT Cluster

The Mioni ICT Cluster is located in a single building located in Tbilisi on Beliashvili street. The building is a former Soviet semi-military purposed facility that produced multi-purpose computer chips and number of special logical integrated circuits from 1965 to 1992. In 2000-2003, the facility was privatized, and the new owners began the development of a local tech-hub by the renting the renovated offices and production spaces exclusively to IT and technological-related companies.

Currently, there are about 48 different tech companies located within the Mioni Cluster's premises, of which the assessment team interviewed 25. The vast majority of the respondents stated that they have had experience working with other companies working in the Mioni Cluster. Moreover, the main reason for choosing Mioni as their office location was its proximity to other ICT related companies in the same building. Generally, respondents clearly understand the benefits of cooperation within clusters and were familiar with case studies of similar successful ICT clusters in Baltic countries.

C. Recommendations for Promoting Cluster Formation

Globalization is driving the need for clusters and expanding partnerships to maximize their competitiveness through achieving cost efficiencies via shared resources and through joint promotion, sales, and distribution networks. The cluster model can enable companies in the ICT sector to further leverage their local strength and efficiency of cooperation and networking to achieve shared goals. Based on success stories in Europe and Asia, it is essential to gain the GoG's support as public financing is a primary source for clusters worldwide. Additionally, the GoG could introduce incentives for cluster development (as was introduced for the Yang-Tze River Delta and Chungnanma cases) that could rapidly boost ICT development in the country.

Moreover, cluster formation may help to create a critical mass of companies and professionals working in the industry, thereby increasing the readiness of Georgian companies to collaborate on large-scale international projects, which currently is not possible due to limited human capital and financial resource capacities. Therefore, the benefits of Cluster Formation would include:

- **Synergy effect:** increased capacity and market penetration of ICT firms to maximize their competitiveness through achieving cost efficiencies via shared resources and through joint promotion, sales, and distribution networks.
- **Private-Public Dialogue:** ability to advocate for necessary regulatory and/or policy changes through a formal cluster organization;
- **Increased access to Research & Development:** improved research capacity through shared work spaces and IT laboratories, which is critical for ICT development;
- **Expansion of product and service offerings:** collaboration through clusters can enable smaller firms to implement projects in cooperation with cluster members, accessing a larger potential client base and implementing larger project than currently done.

Annex 1: SWOT Analysis

SWOT Analysis 1: Business Software

STRENGTHS

- Highly flexible approach
- Agile, quick development
- Attractive cost-efficiencies

WEAKNESSES

- "As is" approach does not address a wide range of challenges
- Lack of business analytics component
- Low awareness of solution architecture issues
- Poor project management
- Clients' focus on speed over quality

OPPORTUNITIES

- Robust demand growth
- Business landscape is evolving rapidly
- Innovative solutions for "legacy technology"
- Large IT solution providers are not agile or flexible

THREATS

- Competition from digital-world giants
 - Expansion of regulations and regulated areas
-

Category includes all types of Accounting software, in-house ERP and HR, document processing and MISs, Payment platforms and Other locally (in-house) developed systems used in business as a core solutions or supplementary applications to automate various processes.

Strength

1. Maximum consideration of business stakeholders' requirements. Highly flexible approach of developer teams and readiness to adopt, upgrade, change the systems to fit the business/regulatory requirements.
2. Agile-style in development, short timeframes from idea/order to go-live (80% of respondent mentioned time and flexibility is a key issue for success on local market);
3. Considerably low costs of development (most companies managing to keep developers' salaries within the range of EUR 400-2,000 per month, with the average being EUR 1,000).

Weaknesses

1. "As Is" approach – Mostly business software is developed with minimal changes in an existing work-flow. Very often such systems are just "hard-coded" replication of existing business processes of various entities, rather to be an optimized solution considering a wide range of sector/industry experience and/or challenges.
2. Lack of initial business analytics component - Very often while developing business software, vendors as well as customers are targeting operations rather than overall business process. Nobody keeps a big picture and outcome is – not an optimized system, but a sum of "wish lists" of representatives of different departments like accounting/financial, marketing. Actually, it is a case when business requirements defined by line rather than business managers (at least 45% of respondents mentioned, that customers don't know "what they really need" and "we've better understanding of what happens at customer's business").

3. Solution Architecture - Strategic/high-level requirement analysis, structures, Data models, Selection of platforms, methodology, scalability, fault tolerance, security and backward compatibility, other architectural components very often aren't a subject of proper attention/investigation. Rarely business-owners understand the importance of those issues and not very often IT companies have an internal corporate culture and knowledge to properly figure out solution architecture.
4. Poor project management – Lack of project managers who have a good enough knowledge in the field and proper understanding of basics of the IT engineering causes problems in business/IT or customer/vendor communication and leads to schedule breaches, overdue tasks and costs overrun.
5. Code quality, documentation, testing – Due to high sensitivity of customers to IT solution vendors flexibility, costs and timeframes, Companies are mostly oriented to deliver works as fast as possible, often at cost of product quality, especially its components “hidden” for customer/end user e.g. Code quality (structure, comments, variable names, platform independence), Technical documentation – clear and up to date description of modules, their functionality, detailed description of protocols used etc. Testing process often is not duly distinguished from development. (in at least 60% of cases companies don't have dedicated testers).

Opportunities

1. Demand for business software development has a robust growth trend.
2. Due to proliferation of online shopping platforms, mobile banking, money transfer systems, instant loans, block-chain technology - Overall landscape of the business rapidly changes. Following Payment Service Directive 2 implementation the new wave of financial service companies is expected. So, in coming 5-10 years European “wealthy” markets will continue to “absorb” more IT solutions and resources – this opens principle and great opportunities for those new-comer vendors from emerging markets (including Georgia) who're institutionally ready to take a part of the game.
3. The opportunities mentioned above, looks more attractive when we take in account the “legacy technology problems” which large retailers and financial institutions are facing. So, the market will welcome not only smart star-up entities competing with established “giants” of industries, but also these giants themselves, which are open, and will continue to be open, to adopting innovative solutions successfully implemented on emerging markets.
4. Big IT solution vendors are very often too big... Their approach is traditional and mostly effective in long-term, large scale or transformational projects. But today technology life-cycle is 5-10 years and “time to business” parameter becomes decisive – which I think is a considerable opportunity for Georgian vendors – taking in account their strong focus on customer needs, cost-saving and short time-frames of delivery.

Threats

1. Competition from digital-world giants – following the Shift of diversified IT infrastructure and communication to giant and inexpensive clouds, commoditization of banking and other sectors, emerging of data-driven economy increases the bargaining-power of big corporations in providing business solutions for “everyone” (e.g. now we see the same trend in general purpose office software). This might eliminate the niche for small companies in continuing to deliver their business systems and solutions.

2. Strengthening and expansion of regulations and regulated areas, (e.g., customer protection law, anti-money laundering requirements, etc.) can increase the expenditures and risks of business and so eliminate Georgian vendors competitive advantage of lean/low-cost approach.

SWOT Analysis 2: Equipment, Electronics, and Hardware

<p>STRENGTHS</p> <ul style="list-style-type: none"> •Flexible to meet client requirements •Attractive cost-efficiencies 	<p>WEAKNESSES</p> <ul style="list-style-type: none"> •Insufficient production facilities and professionals •Difficult to scale up technology due to prior customization for small firms
<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> •Alternative production facilities are available •Success depends on smart, simple, and cost-effective solutions •Short technology life cycles advantage small firms that respond to changes quickly 	<p>THREATS</p> <ul style="list-style-type: none"> •Existing production and product quality problems •Scarcity of professionals •Increase in labor costs can diminish firms' competitiveness

Category includes all customized, specific or general-purpose appliances, hardware and equipment. Particularly in Mioni cluster there are number of companies who're producing equipment for retail business (e.g. self-service terminals. Info-kiosks etc.), various electrical appliances (currency inventors, electrical power units etc.), Access control and parking systems, physical security and remote monitoring equipment. Mostly the products are mixed, customized hardware/software solutions delivered by single vendor.

- **Strength**
 1. Flexibility in fitting customer requirements – All equipment and software are developed by single vendor, so can be easily changed, updated or modified up to end-user needs.
 2. Low costs of development– in comparison with similar or same-purpose products by well-known brands – local products are substantially cheap.
- **Weaknesses**
 1. Quality of production – there is a lack of good production facilities in the country – 20% of respondents mentioned, that there is a scarcity of professionals and equipment of metal and plastic processing, pick and place machines to produce electronics (boards, components) CAD studios and companies etc.
 2. Scalability of production – considering most of the solution are “tailored” and “hand-made” – local facilities aren't adopted to large-scale production.
- **Opportunities**
 1. Nowadays there're lot of companies and countries with mass-production facilities while others (companies and even countries) are mostly focused on delivering Ideas,

prototypes, licenses – High-margin intellectual property which afterwards is used in mass production and scaled-out worldwide.

2. Due to rapid changes in lots of industries – smart, simple and cost-effective solutions are key success factor even for large corporations, this opens good opportunities for small flexible companies and hope Georgian producers can benefit as well.
 3. Short life cycles of technologies we observe today - somehow “depreciates” corporate experience of industry giants – So it opens good opportunity for small/smart companies to successfully compete with matured players, specifically in niche products delivery and/or development or small-scale but high-margin projects implementation.
- **Threats**
 1. Production/product quality problem – which, over time - can eliminate flexibility and cost-efficiency advantages, including due to high maintenance costs.
 2. Scarcity of professionals (e. g. in electronics and related fields)
 3. Due to “open markets” Increase in labor and engineering staff costs which can deteriorate small companies’ profitability.

SWOT Analysis 3: General-Purpose Software.

STRENGTHS <ul style="list-style-type: none">• Flexibility and low product costs• Most products are modern technology	WEAKNESSES <ul style="list-style-type: none">• Lack of corporate culture results in high staff turnover
OPPORTUNITIES <ul style="list-style-type: none">• High growth in "endless" mobile applications and website development sector• Low entrance barriers and remote development provide worldwide market access for entrepreneurs	THREATS <ul style="list-style-type: none">• High levels of competition• Introduction of user-friendly "Do it Yourself" applications and website builders• Market shift from highly skilled developer teams to non-professional "in-house" advanced users.

Category includes wide range of personal, promotional or corporate web pages and application, educational and entertainment applications etc. At "Mioni community" there are not a lot of web studios, app developers and game producers. Cluster mostly focused on business (B2B) and/or mass-market (B2C) solutions.

- **Strength**
 1. Flexibility and low cost of the product
 2. Products mostly based on up to date technology platforms
- **Weaknesses**
 1. Lack of corporate culture high staff turn-over makes difficult to manage project and maintain products.
 2. Quality of product – lack of overall experience causes and architectural drawbacks of the software, capacity and/or security problems
- **Opportunities**
 1. Growing "end-less" market – Web site industry has a 4-5% of sustainable annual growth and is a EUR 25 billion industry. In 2017, the mobile applications market will amount to USD 77 billion with an annual growth rate of about 25% – it creates good opportunity for continuous development on such markets and growth of vendor's customer portfolios.
 2. Low entrance barrier – Applications, web-sites, social, chat, file exchange platforms can be developed by any professional team and easily exposed worldwide. This class of products are good for remote development which creates attractive opportunity for almost anybody to be successful on global market – depending on skills, talent and ability to find/reach the "right" customer worldwide.
- **Threats**

1. A high level of competition
2. Appearance of more “user-friendly”, cloud-based application and website builders (e.g. Webydo) – moving web and app.
3. Development from high skilled developer teams to non-professional, “in-house” advanced users.

SWOT Analysis 4: Integration, SAAS/PAAS, Reselling, Support and Other IT Services

STRENGTHS

- Well-established market linkages with international vendors
- Good understanding of client needs
- Strong corporate practice

WEAKNESSES

- Legal limitations for activities
- Local nature of business activities
- “Corner shop” situation eliminates international competitiveness

OPPORTUNITIES

- Cloning and clustering of companies in other countries
- Rapid migration to cloud solutions and increased regulations create opportunities for regional expansion
- Local physical data storage still needed for mission critical and sensitive systems

THREATS

- Increased competition from global suppliers
 - Prevalent “cloudification” of services eliminates the need for region or country-specific teams
-

Category covers the wide range of ICT services including authorized distributors’ and reseller services with direct focus on export potential of companies involved in mentioned activities.

- **Strength**
 1. Well established international connection (distributors, resellers)
 2. Good knowledge of needs of various categories of customers and so good understanding of markets’ “big picture”
 3. Good corporate practice
- **Weaknesses**
 1. Area of activity legally limited by country and/or region (resellers)
 2. “local nature” of business (tech maintenance companies)
 3. “Corner shop case” – most of maintenance and SAAP/PAAS companies are effective when operating locally/regionally, any international penetration eliminates their competitive advantages.
- **Opportunities**
 1. “Cloning”, “clustering” of companies in other countries, via selling own expertise, experience and/or success stories.
 2. Rapid move toward the cloud and increase of legal/licensed software in use – creates additional opportunities at least for regional expansion;
 3. Despite rapid adoption of cloud platforms offered by industry leaders (Microsoft, Amazon etc.) there’re still sustainable need to keep locally transactional and other data

for mission critical and or sensitive systems (payment schemas, banks, medical entities). Often, it is a regulatory requirement or done just to avoid pure technical - latency effect or similar problems.

- **Threats**

1. Increase in competition from global players
2. Due to further “cloudification” of services – elimination of need for any kind of teams focused on a particular country or region.

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