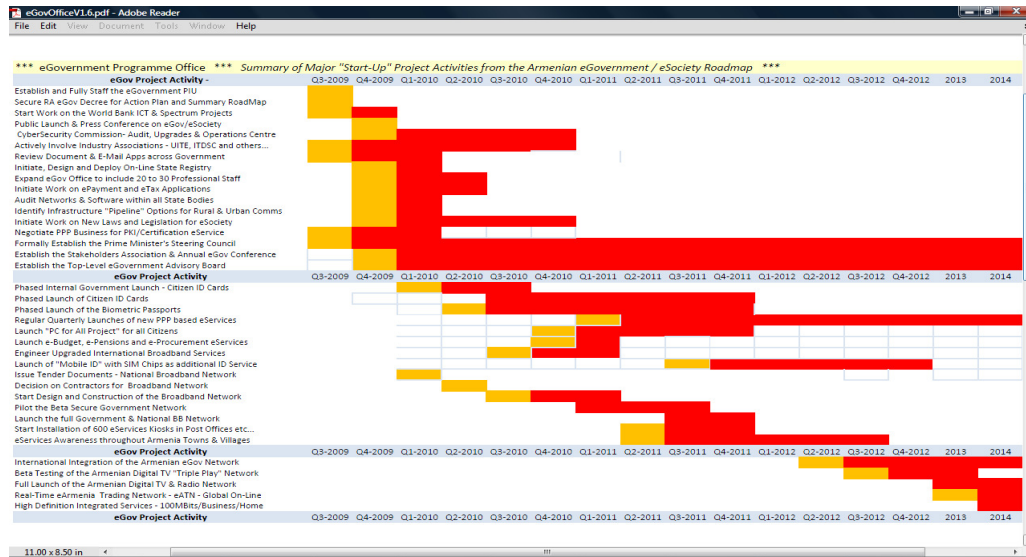




“Roadmap for Real-Time Armenia”

E-Government, E-Commerce and E-Security



“Increasing Business Opportunities for the Armenian ICT Cluster through the development of E-Government, E-Commerce and E-Security”

****** Report Prepared by: Dr David E Probert – VAZA International ******

Executive Summary

a) MISSION: This final report summarises and documents the outcomes from my 21 day Mission to Armenia. The primary tasks, funded by USAID/CAPS Armenia were to support the Ministry of Economy in the further development of the National eGovernment RoadMap, as well as providing expert advice in the area of the proposed “Triple Play” Broadband Network, Cybersecurity, eGovernance, Public-Private Partnerships (PPP), ICT Vertical Clusters and e-Gov Interoperability Standards. During the course of this work, I conducted an extensive review of all previous materials including an analysis of the experience “Best Practices” of more than 20 other countries.

b) ANALYSIS: This work was challenging since it required the practical integration and prioritization of a diverse range of both partially funded and proposed projects. A key section within the report is the overall integrated 5 year eGovernment RoadMap and supporting Project Spreadsheet. The successful implementation of such a long term multi-dimensional programme will require the establishment of an eGovernment Programme Office with a full range of business & technical skills reporting directly to the Prime Minister’s eGovernment Steering Council. The core dynamic is that the eGovernment Office will work with the 18 Ministries and other State Bodies to identify eServices that can be outsourced from Government through PPP Business Ventures with a combination of Armenian and International ICT Enterprises. The expectation is that this will both reduce the long-term government operations budget, and tax burden, whilst significantly boosting the Armenian ICT Sector with regards to scale, size and expertise. The eventual outcome should be to boost the Armenian Economic GDP, and establish Yerevan as an international eTrading Hub. It is also planned to leverage the support, investment and experience from the Armenian Diaspora, as well as the World Bank, EBRD, UNDP and other sources of long-term loans & investment.

c) RECOMMENDATIONS: The implementation of eGovernment will be a transformational experience across Government as well as the Armenian ICT Business Cluster. These strong economic & technological dynamics need to be tightly & professionally managed if the full positive impact of eGovernment is to be fully realized within Armenia during the coming 5 years.

- **eGovernment Programme Office:** Establish eGovernance Organisation including Programme Office reporting to the Ministry of Economy, staffed by top quality professionals, including skills for Project Management, Bid/Tender Management, Technical & Security Architects, Legal, Financial, PPP & Technological Incubation Skills, and PR/Market Communications.

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- **“Triple Play” Broadband Network:** Develop a single national “Triple Play” Broadband Network that will support both the G2G Secure Government Network, as well as G2Business and G2Citizens. This will include the digital radio, voice and television services that will eventually take over from the analogue services during 2013/2014.
- **CyberSecurity:** Implement a CyberSecurity Commission to Audit, and Upgrade information security, computer & software systems through the 18 Ministries & other State Bodies. eServices will only be trusted for trade, business and investment if the supporting network is fully secure, with embedded security software at every point of the eGovernment infrastructure, coupled with security policies and relevant training.
- **PPP Business Ventures:** Launch a pro-active programme, using the eServices summary matrix as a guide, to identify government processes, staff & resources that could be fully outsourced as PPP Business Ventures that will be located in one of the new TechnoParks. The skills and professional networks of the industry councils and associations such as the ITDSC and UITE, as well as EIF should be fully leveraged in marketing & brokering these PPP business ventures.
- **International eTrading:** Strengthen the international broadband connectivity and launch compelling eCommerce Ventures that will attract the investment & business interest of the worldwide Armenian Diaspora of more than 7million persons.
- **eGovernment PR Awareness Campaign:** Finally it is necessary for the Armenian Government to communicate the significant economic & lifestyle benefits to Armenian Citizens, Enterprises and of course potential PPP investors.

d) NEXT STEPS: There is no doubt that the implementation of this proposed programme will be both challenging and complex. However, the recommendations are all based upon the “Best Practice” and experience of other developed and developing nations. In fact eGovernment programmes were initiated by countries such as USA and UK more than 10 years ago, and the benefits to government, business and citizens have been substantial and are well documented in the reference materials. Several excellent reports and proposals have been written regarding Armenian eGovernment and eSociety during the last 5 to 7 years, and yet there was no co-ordinated response. It is now imperative for the Armenian Government to take urgent top-level action in order to quickly develop and engineer Armenia as a successful 21st Century real-time electronic economy. The next 9 months are critical – Sept 2009 to June 2010 – during which most of the key projects will be initiated and co-ordinated. Immediate Actions include:

- Secure Pan-Government/PM Support through new “Decree”
- Establish and fully resource the eGovernance Organisation

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- Hire Professional Project Managers, and PPP Bid & Tender Managers
- Implement National PKI/Certification Authority as an early PPP Venture
- Strict “Real-Time” Project Management across the eRoadMap activities
- Secure necessary international loans & other equity investment funding from multiple sources in order to maximize the leverage from government funds.

d) Summary: Armenia is now at the crossroads of becoming an electronic nation of the 21st Century. During the course of this mission I met with many people and organizations from both government and the private sector. They all shared a passion for implementing eGovernment & eSociety for Armenia, but their efforts have been frustrated through minimal project management and co-ordination across Government Ministries & State Bodies. Now there is the real opportunity for these diverse eGov & eService initiatives to be pro-actively managed through the Prime Minister’s Office and Ministry of Economy. As in other countries, the programme will secure “Win-Win” results for the Armenian Economy & GDP through boosting the ICT Business Cluster, and decreasing long-term government budget through outsourcing currently inefficient back-office government processes to private sector PPP Ventures. In fact, the worldwide credit crunch provides further strong inspiration and motivation to transform high cost physical resources to lower cost electronic resources and on-line eServices. I’d personally like to thank everyone in the Armenian Ministry of Economy, Armenian Government, Research & Educational Institutions, the Private Sector ICT Enterprises & Industry Associations and USAID/CAPS that have supported me during this challenging assignment!

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- (1) **Background:** The Minister of Economy – Nerses Yeritsyan, has been proactively developing a vision and initial projects supporting eGovernment for more than 2 years, whilst Deputy Minister, Vahe Danielyan, coordinates the IT & eGovernment sectors. These projects and programmes include the strategic policy work of eSociety & eGovernment led by Ashot Grigoryan, the Citizen ID Cards and Biometric Passports which is actively managed by the Central Bank of Armenia and RA Police, and most recently the establishment of the Project Implementation Unit led by Arman Margaryan. In addition, there is a network of related activity that include the EIF (Enterprise Incubation Fund) led by Bagrat Yengibaryan, the NORQ Centre that is associated with Ministry for Labour and Social Affairs, and the Mergelyan Institute with a programme led by Arman Kuchukyan.

Following meetings and presentations in Yerevan with the Ministry of Economy, Central Bank of Armenia and Ministry for Labour and Social Affairs during February 2009, USAID/CAPS Armenia developed a comprehensive supporting Task Proposal (included as Annex 2). The core primary objective was to explore in practical concrete ways how the progressive implementation of Armenian eGovernment, and launch of eServices could stimulate the further growth and development of the Armenian ICT Business Cluster through PPP Joint Ventures. This summary report provides a comprehensive analysis of the necessary actions and supporting programmes that should be initiated during the coming months in order that the Armenian eGovernment Programme is successfully deployed.

As background, I personally reviewed more than 100 reference documents provided both by the Ministry of Economy, as well as from exhaustive desk research both prior to, and during the mission assignment in Yerevan. The aim was to take account, so far as was possible, all previous experiences of implementing eGovernment. In the following section (2) I provide some in-depth comments on selected documents & presentations from both ICT vendors, as well as a survey from the specialized literature on e-Government. The topic of eGovernment and eSociety has been intensively studied during the last 10 years by both international consultants and academic researchers. Now is the critical time for Armenia to design, engineer and construct the broadband applications for eGovernment based upon the “Best Practices” which we conclude are those from USA, UK and Germany, together with the Interoperability Standards from the EU – European Interoperability Framework.

Security and Standards are both key elements of the eGovernment Framework, so in section (5) I provide a concrete proposal within the context of the ITU (International Telecommunications Union – Geneva) documented “Best Practice” for cybersecurity in developing countries according to the well respected ITU Security Standards X805. I would

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emphasise that only with the requisite security policies, training, and national cybersecurity centre will the Government eServices and Commercial eTrading be fully trusted and used as tools for economic recovery and growth during the coming 5 to 10 years. There are several related and complimentary security frameworks that include the well known ISO2700X series that links well with the ITU X805 standards. Together they provide a comprehensive operational security framework for the management of all eServices, including those deployed within the context of interactive Web2.0 applications on mobile devices. Finally I should mention the extremely useful security framework that is updated every 2 years by the Information Security Forum – www.securityforum.org. Their complete 372page downloadable Standard for Security Good Practice (November 2007) spans absolutely every aspect of Security Management including: Critical Business Applications, Networks, Systems Development, Computer Installation, and the End-User Environment. The IT Service Management (ITSM/ITIL) Model for Best Practice, with supported Certification is also relevant to the Armenian ICT Environment in order to boost the professional service support and management for Government ICT Operations.

I also explored the relevance and implementation of Business Continuity Planning (BCP) and Disaster Recovery (DR) for the Armenian Situation. ASIS International (American Society for Industrial Security) provides regularly updates regarding BCP/DR Guidelines, as well as Standards and Training Manuals, which include the roles and responsibilities of the Chief Security Officer (CSO). Today in the Armenian Government there is very little BCP/DR planning whatsoever, and the underlying network & computer systems are not resilient. In general, the Government should seriously consider duplicating all mission critical network, communications and database resources so that there is no single point of failure. For example, the Secure Government Broadband Network (Government Intranet) might be deployed as a combination of a backbone optic-fibre network, backed up by a high speed, secure and encrypted wireless network (Point to Point Wi-Max, Wi-Fi or Microwave) between the Government Ministries and State Bodies located with 20kms of Yerevan. Information and Databases should also be backed-up and mirrored in “real-time” through IT options such as RAID Memory, Server Virtualisation and “shadow/mirror discs”. In addition, I’d recommend backing up all important Government Information & Documents on secure storage devices & server farm remote from Yerevan, possibly in a deep earthquake, flood and fire proof underground location. This location would then be deployed as the Government Network Operations Centre in the case of National Crisis.

A key recommendation from my mission is the strong importance of implementing the eGovernment Programme through Public-Private-Partnerships – PPP – with enterprises and SME’s within the Armenian ICT Private Sector. It is generally agreed by analysts that the

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implementation of eGovernment can act as an excellent growth stimulant for the incubation of new ICT eService ventures. Within Armenia there remains a skill shortage in some ICT sectors such as cybersecurity, PKI Certification, e-signatures, so there is economic & technical logical to also partnering with international ICT vendors to boost skills. For example, a possible early PPP venture might be in the sector for PKI Certification since every Citizen Card, Biometric Passport or e-Signature requires access to some trusted 3rd party authentication and certification. In this specific case, a “Best Practice” player such as VeriSign might be invited to partner with a local Armenian ICT Player to establish this essential generic eService as a PPP with some level of government funding & resources.

During my 1st visit to Armenia during February 2009, I presented a proposal to the UITE Conference for an international eDiasporaNet or eArmenianTradingNet., which is attached as Annex (3). During this current mission I worked with the Ministry of Economy & partners to explore how the international broadband connectivity might be improved. ICT Start-Up Telco Player – GNC Alfa – is constructing a national 10Gits/Sec Broadband Fibre Backbone Network that will span Armenia from north to south, and eventually provide the foundations for high-speed wired & wireless regional & city networks too. Such initiatives will provide Armenia with the opportunity to significantly expand its eServices & eCommerce and eTrading applications worldwide, and establish the country as a regional hub for electronic trade, finance and business.

The rapid technological convergence of voice (VoIP), streamed video and internet technologies mean that Armenia can immediately move to the “state of the art” – “Triple Play” Broadband Networks – with 10GBits/sec Backbone, and last-mile wired/wireless connectivity at anywhere between 10MBits/sec to 100MBits/sec. The supporting eServices Project Spreadsheet in section (3) shows how the digital television and radio network services can be rolled out as a natural extension of the initial eGovernment eServices.

During Q3FY2009, I recommend that the Government starts to increase awareness of the extensive & transformational eGovernment Programme to both the Business Communities as well as to Citizens through well coordinated professional PR Campaigns. For the ICT Sector there are rich opportunities to establish profitable joint PPP ventures, whilst for citizens they will finally start to have access to 21stCentury Web2.0 applications and Government eServices even in the most remote towns and villages. The vision for “Real-Time” Armenia is compelling, practical and realizable, as demonstrated by full success during the last 10 years from developed & developing countries across the world. However, such transformations of government and society through eGov & eSociety programmes will

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inevitably give rise to concerns which should be fully addressed through a combined off-line and interactive on-line Government PR Programme , back-up by leading enterprises. The successful implementation of a national transformation programme of this scope, breadth and impact requires “real-time” professional project management to ensure that all the various diverse activities are running on schedule, and that any delays or problems are quickly brought to the decision makers and resolved. Hence the critical importance placed upon the eGovernment Programme Office in coordinating the eService initiatives, PPP tenders, bids & negotiations and PR activities – all in a real-time 24/7 operational basis. Some previous eGov/eSociety initiatives in Armenia have failed to “bear fruit” since there was insufficient Cross-Government, Trans-Ministry communication & management. The eGovernance structure proposed in this report was used in the “Best Practice” countries of USA, UK and Germany, where in each case a central dedicated eGovernment Unit was established with excellent leadership, and staffed with top skilled professional from both public and private sector. Now is the time for the Armenian Government to take action! During the course of the mission I understood that the necessary resources – technological, financial and managerial – could all be secured during the coming 6 to 9 months through international banks, investment funds, and partnerships with international ICT enterprises. I sincerely hope that this summary report may serve as the first step in helping both the Armenian Public & Private sectors to work together through the PPP business ventures to design, engineer & launch the 21stCentury nationwide eNetworks, eSecurity and eServices!

Finally, I should state that I believe that the next 9 to 12 months are absolutely mission critical in the successful start-up and execution of this transformational programme which needs to be initiated through the documented top-down eGovernance Organisational Model. In section (8) I list and discuss the next programme steps in some detail since these need to be well understood. This project is as complex and challenging, as maybe building a new nuclear power plant, or international airport terminal, so the professional project management skills must be of the same top quality. In particular, aspects of the eGovernment project concerns, what some consultants call “business process re-engineering” (BPR) since significant staff resources & back-office process may be outsourced to the private sector as PPPs. Remaining Government staff resources will then be restructured more efficiently and productively to use the new eServices on the secure Government Intranet. So in summary, the successful creation of eGovernment and “real-time Armenia” during the next 4 to 5 years requires a rich combination of professional skills ranging from technological through to human resource, operations & business process re-engineering. I should add that there also needs to be international expertise injected to support the complex financial, legal & structural negotiations of the PPP Joint Ventures.

(2) Analysis of International eGovernment and “Best Practice” : In preparation for this assignment, I was requested by the Ministry of Economy to review all the relevant background materials – more than 100 documents – which can be categorized in the (a) Country Reviews – (b) Vendor Proposals – (c) International Bodies – (d) Armenian eGovernment Projects – (e) Armenian ICT Cluster. I’ll provide a quick summary analysis with the primary aim of recommending “Best Practice for the Armenian Government based upon published literature. I’ll also suggest the preferred “modus operandi” for working with the international enterprises, as well as the options for integrating Armenian eGovernment experience from Norq, Mergelyan, EIF and the Armenian ICT Business Cluster.

- a. **Country Reviews:** Countries such as USA and UK established eGovernment Programme Units, defined their Enterprise Architectures & Interoperability Standards and started to deploy eServices for citizens and business around 10 years ago. Since then most countries have made some progress in the eGovernment Transformation. I reviewed the published strategies from around 20 countries that included USA, UK, Germany, Estonia, Greece, South Korea, Singapore, Canada, Bulgaria, Jordan, Serbia, Malaysia, Israel, Turkey, New Zealand, Georgia and China.
 - i. **USA** – The US Federal Government started to define the comprehensive Federal Enterprise Architecture Framework (FEAF) based originally upon the detailed C4ISR Military Command, Control and Communications Architecture from the mid-1990s. Most of the documentation on both the C4ISR and FEAF architectures are now in the public domain and available on the internet. In 2002, the US Government firmly established and published its eGovernment Strategy, and Federal Task Force with an initial target list of 24 eServices. The last 7 years has seen outstanding progress with a broad range of eServices available through the main US Government Portal of USA.GOV.
 - ii. **UK** – The UK Government established the e-Envoy Office back in 1999 as the initial central task force to co-ordinate eGovernment Activities from the Prime Minister’s Cabinet Office. Then in 2002, this was institutionalized as the eGovernment Unit, again in the Cabinet Office, with the definition and publication of the most comprehensive catalogue of Technical Standards and the eGovernment Interoperability Framework – e-GIF. This transformational strategy has led to many services being outsourced to the private sector as PPP ventures, whilst the remaining Government resources are reorganized to operate more productively with reduced budget, & transparent access.

- iii. **Estonia** – As a post-Soviet Country, Estonia also represents an excellent “Best Practice” country with respect to both eGovernment & CyberSecurity. Estonia has established a range of private sector ventures that are providing eServices & training within Estonia, and also to export their experience to developing countries as such as Armenia. Back in May 2007, the Estonian Government and Banking System was severely “hacked” and attacked through “botnets”. This led the Estonian Government to work with NATO to establish an International CyberSecurity Operations Centre that could respond in real-time to any future crisis, as well as provide expert training.

- iv. **Jordan** – The Jordanian Government established and published a well structured eGovernment strategy back in 2006. I personally found these documents of some relevance to the Armenian situation since there are some similarities in the association with Middle Eastern culture, as well as in size, economic situation, and political issues with neighbouring states.

- v. **Germany** – Being the largest, by population, of the European Countries, the German experience in eGovernment is also very interesting. The German Ministry of Interior published their pioneering “Standards and Architectures for eGovernment Applications” in December 2003, whilst their IT Security Guidelines published in 2004 provides excellent background for “Best eGov Security Practice”, if somewhat dated by recent Web2.0 developments. I should note that the German Government actually established a dedicated Government Agency (Bundesamt) for Security and Information Technology.

- vi. **Israel** – Here is a country that also has a global diaspora! Israel has also been a hi-tech pioneer in the application of eGovernment & eServices to create more efficient and focused Government processes. In addition, Israel has extremely successful in incubating spin-off technology businesses, with ICT innovation clusters located around Tel-Aviv, Haifa and Jerusalem. A good eService example is the AVIV application within the Ministry of Interior that serves as their National Registry for Citizens, Migrants, Tourists & Workers.

In continuing the country review, it becomes clear that there are significant economic, social and business benefits to both developed and developing economies. A parallel

review by the UNDP published in 2007 highlights the USA, UK and GERMANY as the leading countries implementing “Best Practice” to which I would add ESTONIA.

- b. Business Proposals & Mission Reports from International Organisations:** As one of my top-level tasks and deliverables within the USAID/CAPS 21-day Assignment I was requested to review a range of submitted proposals from both private and public sector organizations. This work was completed within the first 10 days of my mission and a summary report submitted to USAID/CAPS and the Ministry of Economy.
- c. Armenian eGovernment Projects:** These documents span projects such as the ePensions (NASDAQ OMX) Citizen ID and Biometric Passport Project (Ministry of Economy, Central Bank of Armenia and RA Police), as well as projects from the Ministry of Labour & Social Affairs (NORQ), EIF (PC for ALL Project), and the Mergelyan Institute (eServices Platform & AREV – Text to Speech for the Blind).
- i. e-Pension:** This NASDAQ-OMX led project provides the most comprehensive project documentation with regards to project spreadsheets, timelines and generally an awareness of the “Best Practice” principles for Project Management. I should add that the key learning in this project is the importance of stating upfront that overseas consultants (in this case from Estonia and Sweden) should be permanently located in Yerevan during critical stages of the project. This will support local skill transfer as well as ensuring that the final solution takes full account of the conditions in the local environment.
 - ii. Citizen ID Card/Biometric Passports:** I was first briefed on this project by the Ministry of Economy and Central Bank of Armenia during my visit to Yerevan in late-February 2009. Progress during this time has been somewhat slow and hampered by the fact that, apart from an initial concept draft, there is no comprehensive business or project plan despite the upcoming 1st January 2010 deadline for ID Card Trials. I would recommend that the Government conducts a rapid review of the project status, redefines the project management responsibilities with a requirement to submit a full business plan and project plan by 1st Sept 2009.
 - iii. PKI/Certification & e-Signatures:** Many projects will require the availability of on-line trusted encrypted “certificates” to support ePayments, eTransactions and the authentication of ID Cards & Biometric Passports. The

PIU within the Ministry of Economy is assigned the responsibility for the Government e-Signature project, as well as the associated PKI (Public Key Encryption) Certificates. This project is now urgent and “mission critical” and it is recommended that the Government strongly consider this common eService as one of the early pilots for PPP Joint Ventures with a “Best of Breed” company such as the well respected US-based VeriSign.

- iv. **PC for ALL:** This ambitious programme aims to provide PCs with special credit terms to enable citizens to access both government & commercial eServices. Companies such as Intel, Microsoft, HP and IBM are all actively interested in supporting the programme during the coming years. I should add that once the National Broadband Network is fully deployed during the coming 3 to 4 years, it will be possible to provide lower cost & faster access using “Netbooks” in which the applications reside on the network (“Cloud Computing”). In fact, the next generation of 3G mobile phones would also provide rich access to eGovernment Services, and hence it is vital that such mobile interfaces are included in the standards for future eServices.
- v. **NORQ:** The NORQ Information-Analytical Centre provides some excellent operational e-Document applications support & training services for eGovernment, especially within the Ministry for Labour and Social Affairs. It is recommended that NORQ is actively included within the overall Armenian eGovernment Programme so that its skills, experience, applications and training facilities can be fully leveraged for all.
- vi. **Mergelyan Institute (YCRDI – Computer Development and Research Institute)**
This former prestigious Soviet Institute for Mathematical Machines (including the IBM Computer Clones for the 1045/1046) has also develop some interesting working PC Network applications. The institute has essentially provided a demo test-bed of e-Government document management, included the option to specify information process flows. An application – AREV – for multilingual text to speech has also attracted some media interest and real world applications for the blind. In fact many of the Institute facilities have been acquired by the leading Russian ICT Vendor – SITRONICS – that plans to establish a Business Centre within an Economic Free Zone on the Campus of the Mergelyan Institute, though progress is so far painfully slow. It is recommended that the eGovernment Programme Office reviews the applications and skills from the Mergelyan Institute and explores ways to

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integrate this software development & support expertise within the overall national eGovernment programme. There are certainly some useful learnings from the impressive work of the institute, but unfortunately the development culture is non-sustainable within the modern ICT business world. I’d like to personally thank Academician Arman Kuchukyan for his full & active support.

- d. Armenian ICT Business Cluster:** I also reviewed a broad range of materials on the growing ICT Cluster, as well as meeting with several companies, both at the Digitec Forum on 19th/20th June, and in private meetings during the course of my assignment. Apart from the proactive cluster co-ordination through the UITE, and the support from the USAID/CAPS Programme, the ICT Cluster is still relatively fragmented and immature compared with other countries such as, say, Estonia or Israel. In the next phase of the “Real-Time” Armenia programme it is recommended to try and actively partner specific ICT Businesses for the joint delivery of selected eGovernment Services – both vertical & common services. This can be moderated through UITE/ITDSC rather like an IT “dating agency” to secure a good skills and applications match between the partners. In addition, each PPP joint venture should be injected with an international ICT partner to offer “state of the art expertise” with proactive skills transfer to the Armenian Economy. It is recommended in the eGovernment Roadmap that this partnership programme to identify the early PPP eService Venture should be initiated by the Government during Sept/Oct 2009.

(3) Armenian eGovernment / eSociety Roadmap : 2009 to 2014

Basic Principles : eGovernment is a complex project that will be a strong integrating force for the transformation of the Armenian Government from the 20th to 21st Century. The following eGovernment Roadmap is based upon a thorough and exhaustive analysis of "Best Practice" from many developed and developing countries from around the world. The Roadmap has been extended to also include aspects of the expanded eSociety in which a diverse and growing range of Government and Commercial Interactive On-Line Services will be available to Armenian Citizens during the next 4 Years from 2009 to 2014. The Principle Activities can be defined in 4 categories:

- a. **Organisation :** Formal establishment of the Strategic RA eGovernance Council led by the Prime Minister, supported by the Operational eGovernment & eSociety Programme Organisation & assigned Project Teams. These will be coupled with an overall eGovernment Advisory Board of Business Leaders and an eGovernment Stakeholders Association for all other interested Businesses & Institutions.
- b. **Technology:** Design, Development and Deployment of a comprehensive national and international Broadband Network connecting citizens, businesses, and government staff across the country, from villages, towns and the major cities. The project investment will derive from a combination of International Bank Loans, Government Funding and Private Sector Investments, integrated through PPP.
- c. **On-Line Services:** A diverse portfolio of both Government Applications Clusters, as well as Commercial Sector Applications will be regularly launched during the next 4 years. These will be implemented as Public Private Partnerships - PPP - that will typically combine Government resources (Staff and Investment Funding), with those of Armenian Business, and also maybe an International ICT or Services Partner. Some eServices will be implemented as 100% Private Sector Ventures, whilst in certain strategic services, the Government may decide to take a controlling stake.
- d. **Legislation :** The creation of the new broadband infrastructure, eServices and Citizen ID Cards will also require the discussion and implementation of new laws & legislation that govern the business activities and transactions in cyberspace. These new laws will need to be coupled with a rigorous approach to cybersecurity in order to protect all government information, and related personal citizen databases.

Roadmap: Here we list the various key programme activities. These will subsequently be shown in more graphical detail within a supporting project spreadsheet. For convenience we have grouped the activities within Project Phases starting with **Phase Zero**, and moving to the final **Phase Three**:

Phase 0 = RA Government Decree : Secure Government Approvals and New PM Decree

Q3 – 2009 – July-August-September – Secure PM Approval for eGov/eSoc Roadmap : Decree, and line up organisation, resources, financial donors & government budget next 6 months.

Phase 1 = Public Announcement of eGovernment & eSociety Programme : Includes the PR Launch , Establishment of the e-Governance Organisation and 1st eService Launches - Note: Phase 1 represents the *mission critical* 9 Month Programme Launch that spans Sept 2009 through June 2010 in which the RA Government sequentially initiates *all* the supporting projects.

Q4 2009 – October, November, December 2009

- Start Consultancy Work – ICT Infrastructure & Spectrum Allocation
- Public Launch of the e-Governance Infrastructure and eServices Programmes
- Involve Industry Associations and Committees such as ITDSC and UITE as moderator/broker for PPP Government eServices Matrix Applications with regular Quarterly Updates
- Announce CyberSecurity Government Commission – 3 month Pre-Project
- Review Document & E-Mail Applications across the RA Government
- Initiate, Design and Deploy the State Registry of Citizens – 6 month Project
- Expand eGovernment Project Unit to include legal/financial support for PPP ventures
- Initiate work on Government e-Payment Gateway Services, as well as e-Tax Application.
- Audit Networks & Supporting Software used by Ministries and State Agencies
- Identify necessary urban & rural infrastructure such as underground pipelines for the installation of fibre-optic communications cables.
- Initiate work on new Legislation to criminalise on-line fraud, distribution of unacceptable content, and protect software & multimedia copyright including music, films and TV. The new Laws should be expanded to cover all aspects of eCommerce and On-Line Business.

Q1 2010 – YEAR ONE

- Internal Government Launch – Citizen ID Cards (President’s Decree - 15th March 2008-53A)
- Issue Tender Documents – Government Broadband Network & National Backbone Net
- Start core CyberSecurity Project – Trans-Government Security Review, Audit and Upgrades, including consideration of eServices Business Continuity Planning and Disaster Recovery.
- Phased Launch (Government & Brokers) of the NASDAQ OMX : e-Pensions Programme
- Open PPP Negotiations for vertical applications such as eCommerce, Distance Learning and eEducation, e-health, Telemedicine, e-Procurement, e-Social Services, e-Budget, e-Diaspora, e-Agriculture, Government GIS/Maps, e-Utilities, Land Registry Cadastre & GIS Services, e-Customs, e-Taxes, e-Driving/Insurance, and then the Horizontal or Common Services – e-Payment, Web Services, e-Signatures/PKI Certifications.

Q2 2010 :

- Review and Finalise Proposals for Broadband Network – Efficiently negotiate and agree contracts for the 1st Phase of Implementation, focusing upon the Secure Government Intranet as the focus for the initial “Beta-Pilot”
- Issue Invitation to Programme Stakeholders including Public Institutions and Commercial Organisations – both Armenian & International Enterprises – join the governance team as interactive observers, to add their experience, technical & business knowledge.

Phase 2 = DESIGNING and ENGINEERING Secure Armenian eGovernment and eSociety.

Q3 2010 : The challenging Phase 2 is split between 3 separate & supporting sub-phases that will be managed through parallel project offices:

- Phase 2A :Start work on engineering and deploying Secure Government Network
- Phase 2B :Generic Common Services for eArmenia – 1 Service/Quarter = PPP/100%
- Phase 2C :Vertical Government Applications for eArmenia – 1 or 2 New Services/Quarter
- Engineer Upgraded secure International Broadband Gateways thru Turkey, Iran, Georgia, combined with strategic Satellite connections for special secure Government Services. Also deploy AES encryption at least using 256bit key, and up to 1024bit key for secret comms.
- Launch “PC for All Project” - Roll-out in parallel with the “Triple Play” Broadband Network.

Q4 2010 :

- Full National Public Phased Launch of Citizen ID Cards (during 2010 to 2012)
- Launch e-Budget, e-Pensions, and e-Procurement Cluster Applications
- Completion of CyberSecurity Project – Launch of National CyberSecurity Office

Q1 2011 – **YEAR 2**

- Pilot the Beta – Secure Government Broadband Network between Ministries in Yerevan.
- Regular Quarterly releases of new eServices, eGovernment Applications – Target 2/quarter = 6/year over 4 Years = 24+ Applications – most within either 100% private or PPP JV format. PPP Model = Armenian Government, Armenian Private ICT Business Sector , and short-listed International Corporations.

Q2 2011 :

- Extend the Secure Government Network to the Regional Administration Offices.
- Installation of at least **600** Broadband Kiosks in Post Offices, Banks, & Schools.

Q3 2011 :

- Completion of National Broadband & Secure Government Network – all Cities & Towns are connected with phased deployment to ALL villages through wired/wireless comms.
- Implementation of Mobile ID with SIM Chips, as well as Biometric ID for improved security

Q4 2011 :

- Continue Roll-Out of PC/Broadband for ALL – including students, schools, pensioners
- eServices Awareness: Train-the-Trainers for School Teachers & Professionals, with training sessions rolled out through schools and culture centres throughout the next 6 months. Every citizen should be “broadband enabled”, and offered chance to purchase either PC Laptop or Wireless Netbook on special credit through the eGovernment Programme.

Phase 3 = International Extensions of eGovernment, and Upgrade to Digital TV.

Q1 2012 - **Phase 3A – YEAR THREE** – International eServices – eDiasporaNet – “Real-Time Armenia”

Q2 2012 – Integration of the Armenian Government network within the International Government Networks based upon advice and mediation from the United Nations – UNDP – USAID & World Bank. Including Europe, USA, Russia, and Far Eastern Countries according to InterOp Standards

Q3 / Q4 2012 - Beta-Testing of the Armenian Digital TV Broadband Network

2013 – **Phase 3B - YEAR FOUR** – Full Implementation of Armenian eSociety

- Launch Digital Broadband Television, accessed through either streamed on-line broadband media or classic antenna systems using common city to city backbone net for all services.
- Real-Time Armenia – eArmenia Trading Network – eATN – Global On-Line Services.

2014 – **Phase 3C – YEAR FIVE** - High-Definition Integrated Services : Switch over to Voice over IP (VoIP) from switched voice for the national Armenian Telecommunications Networks, and consolidation of Digital TV with addition of further international digital TV Channels that could be “pay TV” options for a PPP company, including New Release Films, Sports & Hi-Def Content.

In the following Table 3.1 the project activities during the coming 4 to 5 years are summarized as a project spreadsheet in which each launch activity is shown in orange, whilst the mainstream roll-out activities during the following quarters and years are shown in red. In reality, the actual project plan will become more complex as top level actions are broken down into lower level actions which will need to be managed in “real-time” by a fully trained professional project manager.

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Table 3.1 – Project Spreadsheet for the Armenian eGovernment and eSociety Programmes: 2009 to 2014

*** eGovernment Programme Office *** Summary of Major "Start-Up" Project Activities from the Armenian eGovernment / eSociety Roadmap ***																
eGov Project Activity -	Q3-2009	Q4-2009	Q1-2010	Q2-2010	Q3-2010	Q4-2010	Q1-2011	Q2-2011	Q3-2011	Q4-2011	Q1-2012	Q2-2012	Q3-2012	Q4-2012	2013	2014
Establish and Fully Staff the eGovernment PIU	Yellow															
Secure RA eGov Decree for Action Plan and Summary RoadMap	Yellow															
Start Work on the World Bank ICT & Spectrum Projects	Yellow	Yellow														
Public Launch & Press Conference on eGov/eSociety	Yellow	Yellow														
CyberSecurity Commission- Audit, Upgrades & Operations Centre	Yellow	Yellow	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
Actively Involve Industry Associations - UIITE, ITDSC and others...	Yellow	Yellow	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
Review Document & E-Mail Apps across Government	Yellow	Yellow														
Initiate, Design and Deploy On-Line State Registry	Yellow	Yellow	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
Expand eGov Office to include 20 to 30 Professional Staff	Yellow	Yellow	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
Initiate Work on ePayment and eTax Applications	Yellow	Yellow	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
Audit Networks & Software within all State Bodies	Yellow	Yellow	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
Identify Infrastructure "Pipeline" Options for Rural & Urban Comms	Yellow	Yellow	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
Initiate Work on New Laws and Legislation for eSociety	Yellow	Yellow	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
Negotiate PPP Business for PKI/Certification eService	Yellow	Yellow	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
Formally Establish the Prime Minister's Steering Council	Yellow	Yellow	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
Establish the Stakeholders Association & Annual eGov Conference	Yellow	Yellow	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
Establish the Top-Level eGovernment Advisory Board	Yellow	Yellow	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
eGov Project Activity	Q3-2009	Q4-2009	Q1-2010	Q2-2010	Q3-2010	Q4-2010	Q1-2011	Q2-2011	Q3-2011	Q4-2011	Q1-2012	Q2-2012	Q3-2012	Q4-2012	2013	2014
Phased Internal Government Launch - Citizen ID Cards			Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Phased Launch of Citizen ID Cards			Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Phased Launch of the Biometric Passports			Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Regular Quarterly Launches of new PPP based eServices			Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Launch "PC for All Project" for all Citizens			Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Launch e-Budget, e-Pensions and e-Procurement eServices			Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Engineer Upgraded International Broadband Services			Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Launch of "Mobile ID" with SIM Chips as additional ID Service			Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Issue Tender Documents - National Broadband Network			Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Decision on Contractors for Broadband Network			Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Start Design and Construction of the Broadband Network			Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Pilot the Beta Secure Government Network			Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Launch the full Government & National BB Network			Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Start Installation of 600 eServices Kiosks in Post Offices etc...			Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
eServices Awareness throughout Armenia Towns & Villages			Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
eGov Project Activity	Q3-2009	Q4-2009	Q1-2010	Q2-2010	Q3-2010	Q4-2010	Q1-2011	Q2-2011	Q3-2011	Q4-2011	Q1-2012	Q2-2012	Q3-2012	Q4-2012	2013	2014
International Integration of the Armenian eGov Network			Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Beta Testing of the Armenian Digital TV "Triple Play" Network			Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Full Launch of the Armenian Digital TV & Radio Network			Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Real-Time eArmenia Trading Network - eATN - Global On-Line			Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
High Definition Integrated Services - 100MBits/Business/Home			Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow

(4) eService Development Opportunities for Public-Private Partnerships

- a) **eService Tables:** In the following Table 4.1 we consider various vertical eServices according to each Armenian Government Ministry and State Body. Then in Table 4.2 we consider common eServices that may generally be required as part of the common applications infrastructure to support a range of vertical services. For example services such as PKI/Certifications and e-Signatures will be required practically all transactions that need the authentication of Citizen ID Cards, Biometric Passports or electronic payments for eGovernment or eCommerce Services.
- b) **PPP Ventures:** These tables of eServices are by their nature rather preliminary, but they show to demonstrate that there are relevant services for EVERY Ministry, and so the eGovernment Programme should be inclusive with regard to all Government processes. It is expected that many more eService opportunities will be added to this initial matrix during the coming 6 months as Government and the ICT Sector get together for discussions with regard to possible PPP Joint Ventures. I would expect that entrepreneurs within the Armenian ICT Business Cluster will quickly realize the business potential once these new eServices are scaled up for delivery to the entire population of Armenia as a guaranteed market during the coming 3 to 5 years as the Broadband Networks expands across Armenia. In fact some eServices in vertical markets such as eHealth, and eEducation may scale-up for supporting Armenians within the worldwide diaspora in markets such as distance learning, or telemedicine. In addition, common horizontal applications such as ePayment, eFinance and eCommerce will also be relevant for a scaled-up international eTrading Network.
- c) **Timescales & Priorities:** In the final column of each table we provide some idea of the suggested timescale and prioritization of each vertical cluster or horizontal applications. Again, these are rather subjective based upon the perceived importance of these services within the overall political and economic framework. Clearly there will need to be some eventual prioritization since the government and private sector resources to develop and implementation these new services are quite finite. It is expected that the eGovernment Programme Office will discuss and publish a more definitive prioritization, together with some financial budget estimates during Q3/Q4 2009.
- d) **CyberSecurity:** Finally, I'd like to emphasise the importance of eSecurity which will need to be embedded within every eService applications. This is an excellent market niche for Armenia to develop its ICT skill base since cybersecurity remains a critical global need.

Table 4.1 – Summary of eService Development Opportunities for PPP Ventures

Government Organisation, Ministry and State Bodies	eService Development Opportunities - PPP	Suggested eGovernment Timescale and Priority
HealthCare	Personal Health Records, Appointments, Telemedicine	2011 – HIGH
Foreign Affairs	Visas, Passports, Embassies, Worldwide Diplomatic Service	2010 – HIGH
Economy	eGovernment Programme Unit, On-Line Economic Reports, e-Pensions, NASDAQ OMX	2010 – HIGH
Nature Protection-Environment	Nature Reserve Proposals, Hunting & Fishing Licences	2011 – LOW
Education & Science	Distance Learning, Multimedia Courses, Video Lectures	2011 – HIGH
Transport & Communications	Travel Details, Road Conditions and Closures, Communications Services & Operators	2011 – MED
Justice	On-Line Laws, e-Signatures, New Legislation for eServices	2010 – HIGH
Agriculture	Farming – Crop & Animal Prices, Weather, Planning Tools for Farmers, Resources	2012 – LOW
Finance	eBudgets, eTaxes, ePayments	2010 – HIGH
Energy & Natural Resources	Utilities, Mineral Exploration Licences, Geological Maps	2012 – LOW
Defense	CyberWarfare, CyberDefense, Integration of Physical and Virtual Defence Solutions	2010 – HIGH
Labour & Social Affairs	Welfare Payments, Social Benefits, ID Card Integration	2011 – MED

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Urban Development	Planning Applications, 3D Plans, Architecture & Town & Village Development Plan Proposals	2012 – LOW
Diaspora	DiasporaNet – Web2.0 App, and migration to eATN (Armenian Trading Network)	2010 – HIGH
Emergency Situations	On-Line Alerts, Seismic, Nuclear, Storms, Floods, Fires, Action Alerts to Staff, Rescue Service – Crisis Co-ordination	2011 – HIGH
Sport & Youth Affairs	Services, Bookings, Events	2012 – LOW
Culture	Concerts Bookings, Events	2012 – MED
National Security Service	CyberSecurity Solutions, Protection against Attacks, Information Security-eGOV	2010 – HIGH
Republic of Armenia Police	Internal Domestic Passports, ID Cards, Driving Licences, Biometric Passports, On-Line Fines, Court Judgments, Criminal Records Database	2010 – HIGH
Nuclear Safety	On-Line Sensors, Leaks, Crisis Management Centre	2012 – MED
Real Estate Cadastre	Land Cadastre On-Line	2011 – MED
State Property Mgt	Asset Management – RFID	2011 – MED
State Revenue	Budget, Treasury Management, On-Line Investments, On-Line Tax & Customs Payments	2011 – HIGH
Civil Aviation	Airport Schedules, Bookings, ICAO Standards & Regulations	2011 – LOW
Central Bank of Armenia -TBD	Support for Citizen ID Cards and Biometric Passports - TBD	2010 – HIGH

Territorial Administration : 11 Armenian Districts + Karabakh	Regional eServices, Hospitals, Schools, Social Welfare Portal	2011 – HIGH
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Table 4.2 Common eService Development Opportunities for PPP Ventures

Horizontal eServices	Description	Timescale and Priority
ePayments	Option for ePayment for Government Taxes and Services, with secure Banking & Credit Card Gateways	2010 – HIGH
State Registry of Citizens	Essential database for the operation of practically all eServices, especially ID Cards and Biometric Passports	2010 – HIGH
PKI Certification/Authentication and eSignatures Services	Scalable Solution Urgently required to support all transactional eServices	2010 – HIGH
GIS Land Mapping & Planning	Geographic Information Systems required for all Land Planning, Energy Utilities, Telecomms & Mobile Operators	2011 – MED
Citizen ID Cards/Passports	Top Priority in order to provide citizens with e-Identify	2010 – HIGH
Network Service Operations	Developed as an integral component of the new Secure Government & Public Broadband Networks	2010/2011 – MED
CyberSecurity Centre/CERT - includes Pan-Government Business Continuity and Disaster Recovery Plans	All eGovernment eServices & Operations require embedded security in order to be trusted for on-line transactions.	2011 – MED
Crisis Management Centre	Emergency Centre & Resources	2011 – MED
Government e-Library	Dynamic interactive search for on-line laws, decrees & guides.	2011 – MED

(5) The Organisation and Implementation of Information Security

Section A: Background – The Government of Armenia is proposing to implement a comprehensive and transforming 4 Year eGovernment/eSociety programme to be commenced during September 2009. In supporting this programme it is imperative that Armenian Government urgently initiates and implements a supporting programme for information cybersecurity across ALL levels of Government, and extending to the Financial Sector, Utilities and Major ICT Enterprises too. This short document proposes an intensive programme of work that commences with a 3 month long Pre-Project (Sept to November 2009), followed by an in-depth 1 year duration Main Project.

Section B: Pre-Project – It is suggested to establish a Government Security Commission with 3 ICT Security Specialists from Armenian Government, ICT Business Sector, and a Security Consultant. The pre-project will be scheduled to be completed within 12 weeks with the following outline structure & objectives.

Stage 1 – Sept 2009 – Determine the overall scope of the Information Security (CyberSecurity) Programme across Armenian Government, Utilities and Major ICT Suppliers & Enterprises. This will include the Telecommunications, Mobile and Internet Suppliers, as well as leading Financial Institutions. The commission will consider all existing ITU Cybersecurity Documentation related to the Global Cybersecurity Agenda (listed in Annex A). Based upon this material they will develop detailed plans related to the proposed Open Security Architecture (related to X800/X805), Reference Standards (ISO2700X), CyberSecurity Laws & Legislation and Economic Implications. These concrete plans will also include the proposals for Security Incident Response Centres (CERTS/CSIRTS) and the overall National Strategic Operations Centre for the Armenian Government, and its integration within the existing Armenian National Security Service. The development of these plans will be done in full consultation with relevant Armenian and International Security Organisations that would include of course the National Security Service, Government Ministries, USAID, World Bank, ITU and other International Organisations. During July & August 2009 the Commission would identify, encourage and endorse representation from each of the Armenian Government Ministries, Major ICT Suppliers, & International Security Bodies. During Stage 1, a secure website & on-line forum would be established to allow interactive discussions of the draft project plans & proposals as they are developed by the commission.

Stage 2 – Oct 2009 – Now that the basic organisation is appointed, the commission undertakes an initial audit of the “state of information security” within the Armenian Government. These tasks are delegated to the appointed ICT and eGov representatives from the Government Ministries and Agencies, and overseen by the members of the Commission who provide leadership & mentoring

support. In parallel, the Commission will further develop the recommended security standards and architectures with support from security specialists in the major ICT suppliers as well as the leading banks and suppliers of on-line financial services. At the end of stage 2, each of the Government Ministries will report back their current information & cybersecurity status and these will be discussed 1:1 with members of the expert commission as input for the main project programme. During the closure of pre-project - stage 2 – the commission will also work with the representatives from the Legal and Financial Professions to understand the actions required to develop relevant laws to protect and legislate against cybercrime, personal ID theft, on-line international money laundering, data abuse, and the security of technological applications such as on-line biometrics.

Stage 3 – Nov 2009 – Based upon the initial Government-wide cybersecurity audit, risk analysis and known security weaknesses from previous cyberattacks, the commission will further develop the proposed architectural & strategic plans. The draft plans will be circulated for comment to the appointed representatives from the Government Ministries, ICT Suppliers and International Bodies. These final ratified Main-Project plans will then be submitted to the ITU, and also electronically published on the secure Government WebSite. It is recommended that a round-table seminar is organised in Yerevan during the closure of the pre-project so that all representatives can make final presentations to the commission, and all open issues & problems can be discussed, addressed and included as actions in the Main Project Plan.

Section C: Main-Project – The main Armenian cybersecurity project will take 12 months to implement in 4 quarterly phases starting in Jan 2010, for completion by end-Dec 2010.

Phase 1 – Jan/Feb/March 2010– Organisation, Security Audit and Train-the-Trainer. Following the pre-project will be organised through the appointment of lead CyberSecurity representatives from each Government Ministry, Regional Administration, Major ICT Supplier and International Body. It is estimated that there will be a distributed organisation of around 30 to 40 “cybersecurity cells or teams” within the main project which will act as the main implementation workforce within the programme to upgrade Armenia’s security infrastructure to approved international ISO2700X standards. During Phase 1 - each Cybersecurity Team Leader will receive in-depth security training, of both operational & technical procedures as recommended in ITU CyberSecurity Manuals. These actions will lead to the building of significantly increase cybersecurity capacity, as well as providing the foundations for the parallel implementation and deployment of modern security strategies, policies and procedures throughout the Armenian Government. Specific Phase 1 objectives are:

a) Communicate Project Agenda as finalised in Pre-Project Plans including X805 based security architecture, recommended ISO Reference Standards, & suggested biometric ID & RFID solutions.

b) Work with the eGovernment Programme Office to ensure embedded security in all applications that will include taxation, customs, healthcare, energy, transportation, finance & defence.

c) Work with the appointed Legal and Economic Specialist CyberSecurity Teams to define the areas for new legislation, and the means of enforcement against national & international cybercrime.

d) Establish On-Line Web2.0 style Forum, possibly Wiki based, for spreading security awareness throughout Armenian Government and leading ICT Enterprises and Business. Content for download would include specially authored papers and support for defining & implementing security policies. This website would be modelled on the far more comprehensive ITU Global Support WebSites.

e) In-Depth Security Analysis and Audits will be undertaken to complement the work already initiated within the Pre-Project Phases earlier in the year. These audits will be mission critical in the definition and financing of the upgrades to the security infrastructure that are actioned in Phases 2,3,4 in the following year – 2010. These upgrades will be in compliance with the newly defined recommendations for the Armenian X805/X8xx based Open Security Architecture as published.

f) Finally, once the initial “Train-the-Trainer” courses are complete, support will be given to extend the training to allow part-time security teams to be formed within each of the nominated Government CyberSecurity Cells. This extended training will continue throughout Phases 2, 3 and 4 until all required Government Staff have received some level of Security Awareness Training from short half-day awareness courses to in-depth multi-day courses for those working full-time on technical and operational cybersecurity programmes within their Government Organisations.

At the close of each Main Project Phases, starting with Phase 1, there will be a 1 day Security Seminar at which ALL Project Team Leaders will be invited to present status reports, discuss progress and highlight areas that require special attention by the top-level commission.

Phase 2 – April/May/June 2010 – Security Upgrades, Training, Legislation, Standards, Policies.

Based upon the pre-project audits, and those completed in Phase1, a work programme will be defined and agree with each of the CyberSecurity “Team/Cell Leaders. It is suggested that the 3 members of the Security Commission divide their time between the 30 to 40 teams, and provide leadership, and technical/operational mentoring support throughout the main project work.

Specific actions & objectives for the Main Project Phase 2 work are:

a) Define, develop and resource the main Government Operations Response Centre, which may include consultation with the existing CERT established by the Armenian Research & Educational Network – ASNET. The project team may also need to use the newly established facilities of the Global CyberSecurity Centre in Malaysia for Advanced Training and Staff Skills Development.

b) Work on the Business Continuity and Disaster Recovery Policies and Procedures that will provide protection against CyberAttacks as well as natural disasters that occur within Armenia including

earthquakes, floods, fires and possible future hostilities. Ensure that training is arranged and completed so that those staff responsible can be fully certified for their positions.

c) Work with the Major ICT Suppliers to ensure that all information and personal data is secured on both cable, mobile, wireless and satellite networks for Government, Business and Citizens.

d) Approve and initiate the required security upgrades to the technical infosecurity infrastructure both within the Government Ministries, Parliament, Prime Minister’s Office and President’s Office as well as between these Organisations and the main nodes of the Government Communications & Defence Networks. This work will require the agreement to the standards for secure organisational interoperability based upon references models such as the UK/eGIF and the EU/EIF – European Interoperability Framework.

e) Continued work on the new cybersecurity, cybercrime, ID Theft and financial fraud legislation to ensure that this is approved by Parliament and the new laws ratified within 3 to 6 months. New codes of operation and conduct will be defined within relevant spheres of eBanking & eCommerce.

Again, there will be a 1-day cybersecurity seminar as closure for Phase 2. The main purpose at this stage will be for team leaders to highlight those topics or issues that require extra resource , budget or focus to ensure successful completion before project end in 6 months time.

Phase 3 – July/August/September 2010 – Core Implementation of InfoSec Upgrades in all Sectors. Focus on InfoSec/CyberSecurity Standards, Compliance and Deployment of Policies. This phase is destined to be extremely intense and will be CORE within the overall project schema. The major actions and objectives for this phase will be:

a) Completion of the InfoSec Upgrades within each defined Government CyberSecurity Cell/Team, followed by testing and training of the required standard policies and operational procedures. This phase will include scenario training to ensure staff can respond appropriately & quickly to any incident report submitted and received through the CERT/CSIRT or Security Operations Centre.

b) The commission will work with each team to define and deploy the appropriate security policies for their organisations, in compliance with the agreed international ISO Reference Standards.

c) Continued work to ensure full info security procedures are agreed and implemented by each of the major Armenian ICT service suppliers with particular focus on the Internet & Mobile Services.

d) Training Courses, as discussed above, will continue, and will almost certainly be provided one of the respected Armenian Universities, Colleges or National Business Schools, supplemented by commercial ICT specialists for in-depth technical cybersecurity topics. Such training will, in reality,

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need to be provided on an on-going basis, with the recommendation that degree-level courses in Advanced Security Management and Technologies are established to boost the specialist skill base.

e) During this Phase 3, it may be appropriate to organise study trips to other countries so that senior staff can study during the course of 1 or 2 weeks advanced implementations in neighbouring European Countries or possibly even USA, or countries such as Malaysia in South-East Asia.

f) Work on the new legislation and codes of conduct for electronic financial services will need to be co-ordinated with international organisations such as bodies within the European Union, and Interpol to ensure that the new Armenian laws can be enforced at an international & global level.

Again, there will be a closing Phase 3 all-day seminar for all team leaders. This time the focus will be upon ensuring that all subprojects are synchronised and connected so that as the main project reaches closure, the distributed network of cybersecurity cells/teams will be fully functional.

Phase 4 – Oct/Nov/Dec 2010 – Project Wrap-Up, Completion of Security Implementation, Final Training Courses, Communication and Implementation of all Strategies & Policies. The intention is that the bulk of the project actions will be largely completed within Phases 1-3, so that in this final Phase 4, the focus is upon the institutionalisation of cybersecurity policies and procedures within the day-to-day culture of Armenian Government Operations. Hence the specific actions and objectives for Phase 4 are :

a) Manage the Public Launch of the Armenian Government Secure Operations & Response Centre.

b) Synchronise the work on cybersecurity with the launch of new eGovernment Applications.

c) Fully communicate the Armenian Government Security Policy to ALL Staff, and ensure real-time monitoring of compliance and validation through a small core team based in the CERT/SOC.

d) Institutionalise the Training as discussed above such that one or more public high-level educational institutions provide on-going basic and advanced security training for operational, technical and management level staff. Focus on boosting and building the skills capacity within Armenia for at least the next 3 to 5 years to ensure a steady flow of trained graduate students.

e) Transition the Project for on-going Management to a full-time Armenian CyberSecurity Council that will have strong links or be integrated within the existing National Security Service.

f) By this phase 4, ALL new legislation relating to cybercrime, cyberattacks and on-line fraud should be approved and ratified by Parliament and the Government for enforcement by those authorities within the police and military responsible for tackling on-line fraud, crime and hostile threats. To be successful, these actions should all be co-ordinated within the relevant international bodies. This legislation will include those requirements for multimedia, software & applications copyright.

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g) During the closure of Phase 4, and the main project, there will probably be a Government Press Conference to communicate the results of the 12 month programme, and to emphasise both the fact that Armenia now has a secure infrastructure in cyberspace, and that everyone – from individual citizens, through to small-medium business & major enterprises are *all* responsible for the on-going security of personal information, data, multimedia content, IDs, & biometrics.

h) Finally, following the closure of Phase 4, it is suggested that a Government CyberSecurity Conference is organised with invited papers from security professionals, as well as awareness style marketing presentations to communicate the on-going benefits of on-line security in Armenia.

Section D: Major Project Deliverables

a) Information Security Architecture, Strategy, Policy and Standards Recommendations for Armenia

b) New Legislation and Enforcement Procedures to control cybercrime, and on-line financial fraud,

c) The creation of a National CyberSecurity Council that will supervise and monitor compliance following the completion of the main project in Winter 2010

d) A national Armenian Security Operations and Response Centre linked to sector based CERTs.

e) Fully trained network of cybersecurity professionals, and institutionalisation of future training.

f) Implementation of the Security Standards, Policies and Architectures throughout Government.

Section E: Proposal References

This is a short, but non-inclusive reference list of documents that were consulted during the preparation of this summary proposal for Information Security & CyberSecurity for Armenia.

a) [ITU – Global Strategic Report – Global CyberSecurity Agenda - 2008](#)

b) [ITU – Electronic Government for Developing Countries – 2008 Draft](#)

c) [ITU – Best Practices for a National Approach to CyberSecurity – 2008 Draft](#)

d) [ITU – Security in Telecommunications and IT – Manual - 2006 \(Russian Version\)](#)

e) [ITU – National CyberSecurity/CIIP Self-Assessment Tool - 2008](#)

f) [ITU – CyberSecurity Guide for Developing Nations – 2007 Draft \(Russian Version\)](#)

g) [US Government – CyberSecurity – A Crisis of Prioritisation - 2005](#)

i) [Steps for Creating National CERTS - 2004](#)

(6) Interoperability Standards and Security

6A) Interoperability: Interoperability Standards lie at the heart of eGovernment, and the first published versions started to appear from the early adopter Governments of USA, UK, Germany and the European Union during 2002. In general these standards are based upon open published standards and span ALL aspects of electronic networks, computing, infrastructure, security, and web content. In 2007, the UNDP made a detailed analysis of 8 e-Government Interoperability Frameworks : Australia, Brazil, Denmark, EU, Germany, Malaysia, New Zealand, UK. Their conclusion with regard to “Best Practice” at this time was that the most comprehensive standards and documentation were provided by the UK, Germany and Denmark, to which I would add the USA which was not included in the survey. There are some eServices such as those relating to Passports, Visas, Interpol, and International Finance that absolutely require operability between applications between Governments. In addition, within countries there is also the need for scalability and interoperability of applications between the Central Government Ministries and the Regional and Local Administration Offices. Adherence to these standards will certainly help such scalable communications between applications although in practice it is likely there will be service specifics that still need some custom software coding to secure full functionality.

Having reviewed the various published technical interoperability standards, of which those for UK and Germany are comprehensively published on-line, I’ve selected those from the UK as being most suitable for localization for the Armenian eGovernment Applications. The UK Technical Standards Catalogue V6.2 (Sept 2005) is available from the UK Government Applications Portal – www.govtalk.gov.uk - together with the more descriptive document, UK e-Government Interoperability Framework eGIF V6.1 (March 2005) which is mandatory for ALL UK Government Ministry, and Regional Administrations. Given the importance of these technical standards, I’ve formally included them as Appendix 3 to this final report on “Real-Time” Armenia. I should also note that updates to the UK e-GIF Standards are regularly posted on the www.govtalk.gov.uk which include recommendations on the deployment of open source eService applications. All the UK eGov Standards are based either on corresponding ISO/IEC Standards – www.iso.org - or else those of organizations such as the www.w3.org, www.icao.int, and RFCs from the www.ietf.org .

The UK Technical Standards Catalogue is 58pages long, so I refer the reader to the Appendix 3 for the full tables. Here I’ll simply provide an overview of the dimensions spanned by the document:

- i. Interconnection & Web Services: E-Mail Transport, e-Mail Security, DNS, FTP, Newsgroup, Real-Time Messaging Services, LAN/WAN Interworking, Encryption Algorithms, Signing, Key Transport, Hashing, Directory Services, Web Services
- ii. Data Integration: Semantic Web Standards, RDF, OWL, UML, Data Transformation and Modelling, XML Signatures, Encryption, and Access Control, and XML PKI.

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- iii. Content Management – MetaData: Data Definition, Content Syndication, MetaData Harvesting, Distributed Searching (Z39.50), Content Sensitive Linking, Identifiers
- iv. E-Services Access:
 - a. Computer Workstations - includes all media types : images, animation, video, vector graphics, spreadsheets, presentations, scripting.
 - b. Mobile Phones: WAP, GPRS, SMS, MMS
 - c. IP Conferencing: Assembly, Audio, Video, Data, Control and Signalling
 - d. VoIP: Gateway Control, Application Layer Signalling, Extended RTCP
 - e. Smart Cards: Extensive Standards from ISO/IEC, including ISO 14443, and spanning applications, electrical, physical, communications, & security.
 - f. Biometrics : Biometric Data Exchange including fingerprints, facial image & iris scans, and also smart machine readable travel documents – passports
- v. Vertical Applications : e-Learning, e-Health and Social Care, e-Finance, eCommerce, eProcurement , eLogistics , and Workflow Management . Generally these are probably less applicable to the Armenian Environment, and standards can be defined according to the eServices that are developed by the PPP Business Venture.

My recommendation is that the Armenian Government (proposed eGovernment Programme Office) establishes a small technical standards group of 2 or 3 specialists to review the UK Technical Standards Catalogue. Their work should take into account the previous work in Armenian from the Armenian Central Bank who proposed an eGOV Standardisation Framework during 2007/2008, as well as the published European Interoperability Framework (2005). I would guess that the standards group would take 3 to 4 weeks to finalise a localized Armenian Version of the standards that also take into account the various local language fonts. I would also suggest that the eGovernment Programme Office retains a full-time technical standards specialist for at least 12 months whilst the Armenian eGovernment infrastructure is being implemented.

6B) Security Standards: Security lies at the heart of eGovernment since the eServices need to be full trusted, safe and secure for both citizens as well as business trade and transactions. There are several versions and variations of the security standards which include:

- i. ISO/IEC 27000 Series which currently includes:
 - a. ISO 27001 – Management Responsibility, Security Audits, & ISMS Upgrades
 - b. ISO 27002 – Risk Assessment, Security Policy, Organisation of Information Security, Asset Management, Human Resources Security, Physical Security, Communications and Operations Management, Access Control, Information Systems Acquisition, Development & Maintenance, Incident management, Business Continuity, Disaster recovery and Compliance.

- ii. ITU – X805 – Based upon the 8 Security Dimensions of : Access Control, Authentication, Non-Repudiation, Data Confidentiality, Communications Security, Data Integrity, Availability and Privacy. There is an excellent book recently published by Carlos Solari on “Security in a Web2.0 World” which analyses both the ITU X805 Standard and the ISO 27000 Series and shows how they are complimentary to each other. The author was CIO in the US Government White House from 2002 – 2005. There is extensive document regarding the ITU CyberSecurity Standards and recommendations for implementation in developing countries on : www.itu.int.
- iii. ISF – Information Security Forum – “Best Practice” : This is published every 2 years, and the latest version was published Nov 2007, and is available for download from : securityforum.org (372pages), & is recommended for the Armenian eGovernment.

Table 6.1 – Information Security Forum : Standard of Good Practice

Aspect	The Standard of Good Practice
Security Management	Keeping the business risks associated with information systems under control within an enterprise requires clear direction and commitment from the top, the allocation of adequate resources, effective arrangements for promoting good information security practice throughout the enterprise and the establishment of a secure environment.
Critical Business Applications	A critical business application requires a more stringent set of security controls than other applications. By understanding the business impact of a loss of confidentiality, integrity or availability of information, it is possible to establish the level of criticality of an application. This provides a sound basis for identifying business risks and determining the level of protection required to keep risks within acceptable limits.
Computer Installations	Computer installations typically support critical business applications and safeguarding them is, therefore, a key priority. Since the same information security principles apply to any computer installation - irrespective of where information is processed or on what scale or type of computer it takes place - a common standard of good practice for information security should be applied.
Networks	Computer networks convey information and provide a channel of access to information systems. By their nature, they are highly vulnerable to disruption and abuse. Safeguarding business communications requires robust network design, well-defined network services, and sound disciplines to be observed in running networks and managing security. These factors apply equally to local and wide area networks, and to data and voice communications.
Systems Development	Building security into systems during their development is more cost-effective and secure than grafting it on afterwards. It requires a coherent approach to systems development as a whole, and sound disciplines to be observed throughout the development cycle. Ensuring that information security is addressed at each stage of the cycle is of key importance.

(7) Proposed Armenian eGovernance Organisation, Roles & Responsibilities

- 1) **Background** – During the coming 4 to 5 years – 2009 to 2014 – the RA Government is proposing to implement an ambitious transformational programme of eGovernment throughout all aspects of Government. The core objectives are to:
 - a. Implement a “triple play” secure broadband network for the delivery of interactive information service, voice and eventually streamed video services across Armenia.
 - b. Deliver a diverse portfolio of both Government & Commercial eServices for the citizens and businesses of Armenia, and hence boost economic growth & GDP.
 - c. Provide broadband international connectivity, and to establish Armenia as a pivotal electronic commercial trading hub between Europe, Asia, Middle East and Russia.
 - d. Re-design government activities through the identification of the major services, and the outsourcing selected activities. This would include both government staff, investment funding, along with private business as Public-Private-Partnerships.
 - e. It is fully expected that the 4 to 5 year process of eGovernment Transformation will result in significant operational budget savings, whilst acting as a strong catalyst to the development of the Armenian ICT Business Cluster through new PPP Ventures.
- 2) **Structure** – The essential structure and organisation is as follows:
 - a. **E-Governance Council:** Chaired by the Prime Minister, with membership that includes the Vice-PM (Minister for Regional Administration), Minister for Economy, Minister for Transport & Communications, Central Bank of Armenia and invited representatives of major Private Armenian Enterprises. The Council would schedule quarterly meetings during 2009/2010, followed by bi-annual meetings thereafter.
 - b. **E-Government Programme Office:** Chaired by the Minister for Economy, the eGovernment Programme Office is responsible for the management and execution of the eGovernment Roadmap: 2009 to 2014. Specific Responsibilities include the following:
 - i. **Business Incubation and Management of all New Government eServices**
 - ii. **Management of PPP Tender Documents, Review and Decisions, which will include the Tenders for the Broadband Network & Citizen ID Cards.**
 - iii. **Working with EIF, and other professional organisations in the provision of specialised incubation support, including legal, financial and business premises for newly established PPP eService Business Ventures.**
 - iv. **Liaison with Ministries and other State Bodies regarding eServices. This includes the on-going audit and identification of possible new ventures.**
 - v. **On Going Policy Development for the Armenian eSociety Programme**

- vi. Specific responsibility for the strategic planning, tender process & phased nationwide roll-out for Digital Radio and Television**
- vii. On-Going Public Relations regarding PPP Tenders & eService Launches**
- viii. Establishing and communicating eGovernment Standards that includes the Broadband Network, Security, eServices, and Interoperability. Also recommendations & guidance regarding use of “open source” software.**
- ix. Primary responsibility for the establishment and operation of the Government PKI Certification and eSignature Generic Applications.**
- x. Initial responsibility for the establishment of the proposed CyberSecurity Commission, and ensuring compliance with the CyberSecurity Policy**
- xi. Cross-Government Liaison with Ministry of Justice, National Assembly and others regarding new Legislation for eCommerce & Cyberspace.**
- xii. Management Support & Guidance with regards to the creation and launch of the public Government Web Portals for Citizens, and Business**
- xiii. Primary co-ordination of eGovernment and eServices Training with other Ministries, State Bodies and Regional Institutions.**

During the period 2009 to 2010 it would be expected that the eGovernment Programme Office would grow to 20 to 30 highly professional staff with skills that include Business Management, Technical Design & Support, Legal, Financial, PR & Marketing, as well as Documentation Management, Tender Preparation and Bid Review Specialists.

It is planned that the Programme Office would gradually mature, and eventually be institutionalised after 2 to 3 years into a permanent eGovernment Unit that would include the Government CIO (Chief Information Officer), supported by CTO (Chief Technical Officer) as well as CSO (Chief Security Officer) and all supporting staff. The unit itself could also be the focus for some form of negotiated PPP Business Model. Many other “Best Practice” eGovernment Countries including UK and USA have transformed and matured to a Business Model based upon this classic CIO/CTO/CSO organisation.

It is also expected that from end-2010 onwards, each Ministry and State Organisation will delegate and train a small core team or 2 or 3 professional staff (also CIO/CTO/CSO responsibilities) to manage the specific eServices, technical support, and cybersecurity for their Government Organisation. The eGovernment Programme Office will provide full training these dedicated Ministerial eGovernment support teams. Again this model has been implemented as “Best Practice” within the US and UK Government Agencies.

- c. **Advisory Board:** Membership of the non-Executive Advisory Board is drawn from prominent business individuals, and would be responsible for providing expert professional advice to the eGovernance Council Chaired by the Prime Minister. It is expected that the Advisory Board would be consulted on major new policy issues, strategic directions, and also upon “Best Practice” management of the eGov Projects. The Board would initially schedule quarterly meetings – 2009/2010 – and members would also be open for professional consultation on an “ad hoc” basis according to their professional experience.

 - d. **Stakeholder Association:** There are also a number of businesses, institutions and associations with a direct interest in eGovernment, eSociety and eServices. This will include Industry Councils and Associations such as the ITDSC and UITE. Members of the Stakeholder Association would be kept regularly informed of progress across all the eGovernment Programmes, and would be invited to comment on new service and business initiatives. It is possible that the Government might consider organising an Annual eGovernment/eSociety Conference or High-Level Seminar that would be sponsored jointly by Government and members of the Stakeholder Association.
- 3) Expected Evolution – 2009 to 2014** – As already mentioned, this eGovernance structure represents the “start-up” organisation. As with all “start-up” ventures there will need to be some seed funding to cover the early expenses, and we provide some ball-park financial estimates in the following section. It should be understood that in general it is expected that the launch of eGovernment through PPP will actually reduce the Central Government budget burden. This is because there will be lower staff resource requirements, whilst at the same time there will be significant front-office and back-office efficiency savings. Citizens will receive more effective, faster and complete services, and hopefully with improved lifestyles.

At the same time it is fully expected that during the 4 to 5 year programme there will be significant and substantial opportunities for the growing Armenian ICT Cluster to participate and invest in the new eServices, both the vertical clusters such as eHealth and eEducation, as well as supporting common services such as ePayments, GIS (Geographic Information Systems) and PKI Certification. The Government of Armenia also proposes to invite international players with both generic ICT expertise (that could include HP, IBM, Intel, Microsoft, Oracle, Motorola, and Telecomms Operators), as well as those with Vertical Software experience for targeted eServices. All business participants would be expected to

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provide up-front PPP style investments with regards to their participation in the provision of outsourced Armenian Government Services.

Finally, it should be restated that as a general principle, it is proposed, during the coming 5 years to outsource through an open Tender Process significant government “back-office” processes and activities in order to reduce the overall Government budget, as well as boosting efficiencies through eServices. The result, as in countries such as USA and UK will be growth in the ICT Cluster, growth in the Economy & GDP, whilst providing Government with savings that can be re-invested into other core infrastructure as well as securing Armenia as a leading international eTrade Hub.

- 4) **Outline Budget Estimates** – The major costs are those related to the establishment and operations of the eGovernment programme Office. Based upon professional staffing levels of 20 to 30 staff, and including training, travel and the costs of additional professional support it is estimated that the budget cost would be \$3M to \$5M during 2009-2012. Following 2012 it is expected the eGov Office would be transformed to a permanent PPP Business Venture that would chargeback for its multiple professional services to the appropriate Government Ministries, State Bodies, Regional Institutions and Enterprises.
- 5) **eGovernment Programme Office – Staff Skills:** Here I gives some more detailed regarding suggested staff skills requirements for this mission critical organisation:
 - a. *Project Managers:* Responsible for managing the overall eGovernment Roadmap, as well as assigned to specific common & vertical projects. These may include:
Integrated Government Web Portal, PKI/Certification/e-Signatures, e-Payments, Secure Government Network Operations, Citizen ID Cards & GIS Mapping Systems
 - b. *Security Specialist:* Responsible for defining the Armenian eGov Security Standards and Policy and ensuring that CyberSecurity is implemented across the Gov Network.
 - c. *Standards, Architecture & Compliance:* Responsible for the on-going management, localisation and upgrades of the Armenian Government Interoperability Standards. And also maintaining compliance with respect to developing and “live” eServices.
 - d. *Tender/Bid Management:* Professional Roles that include the development of Terms of Reference, Tender Documentation, Bid Review and the negotiation of the legal contracts for the proposed PPP Joint Ventures for Government eServices.
 - e. *Legal Support:* Experienced Lawyer to support in-depth PPP contract negotiations.
 - f. *Financial Support:* Experienced Accountant to manage eGovernment Investments
 - g. *Public Relations/ Marketing:* Promoting the “Real-Time” Armenia Programme to Citizens & Business both within Armenia, as well as to overseas investors.

(8) Next Suggested Steps: 2009 to 2010

I’ve already highlighted in the opening executive summary some aspects of the next immediate steps, and the crucial importance of project activities during the coming 9 to 12 month. There are several dimensions to first consider with regards to the current situation and “status quo”:

- a) **eSociety Awareness** : Armenia is a country that is still very much a “cash economy” with minimal use of credit cards and on-line banking & payments apart from Yerevan, and some other larger cities such as Gyumri and Vanadzor. In the UK I use credit cards on a daily basis, whilst since my arrival in Yerevan – almost 3 weeks ago – I’ve only used my credit card once, to guarantee my local hotel meals & additional expenses.
- b) **eBusiness**: At present, business is relatively closed within minimal transparency, based upon traditional Armenian business practices that have evolved over the centuries. The high prices of Internet services coupled with the resistance to business transparency have already led to Armenia remaining in Position 103 of the 2008 UN eGovernment Survey behind even Georgia (90th Position), and Russian (60th Position). Economic growth today is dependent upon a combination of physical and on-line business, which will place the Armenian Economy under increasing pressure during the credit crunch.
- c) **eSecurity** : Again Armenia has no developed on-line security culture, with minimal security policies & training. Anti-virus software & other necessary on-line protection frequently being self-administered rather than part of a formal ICT programme.
- d) **eNetworks**: Whilst the national mobile phone network – VivaCell and Beeline – are well developed with national reach, the corresponding Internet infrastructure is typically reduced to dial-up connections in towns and villages outside Yerevan & Gyumri. Armenia remains in the transitional period in which Internet Clubs & Café’s are popular where citizens can secure access to connections at reasonable speeds. Higher speed broadband connections remain expensive compared with average incomes.
- e) **Professional Skills**: Armenia has an excellent scientific heritage in subjects such as physics, mathematics. However, there remains a shortage of professional applied skills in fields such as cybersecurity, PKI/Certification, large project management, PPP joint venture negotiations and experience of international business. Those trained with such skills frequently leave Armenia to re-locate in communities with Armenian Diaspora that are typically Southern California (Los Angeles), or Western Europe (Paris).

So it is clear that that any eGovernment and eSociety programme has to confront serious challenges on several simultaneous fronts. These challenges really set the priorities for the next 6 months, and thereafter the focus is on negotiating PPP ventures, building eNetworks & eServices. I’ll analyse the immediate next steps in 4 stages – building up the full programme – quarter by quarter – as the project moves to critical mass, liftoff, and Pan-Armenia roll-out during 2010-2014.

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***** Q3 2009 – July/August/September - ORGANISE e-GOVERNANCE:** During the next 3 months the eGovernment and eSociety project roadmap has several key objectives:

- i) Secure Government Decree supporting the Roadmap and eGovernance Organisation
- ii) Establish the eGovernance Organisation at each level as recommended in section (7)
- iii) Review and refine the PPP eServices Matrix including more precise service details
- iv) Start work on the World Bank ICT & Spectrum Allocation Programmes
- v) Review eMail and eDocument Applications (Mulberry, Norq etc) across Government
- vi) Consider PKI/Certification (*VeriSign*) as a possible PPP Security Venture
- vii) Actively work with ITDSC and UITE with regards to ICT Business Cluster Participation
- viii) Business & Project Plan Review of Citizen ID Card & Biometric Passport Programmes
- ix) Establish the GEDA – Gyumri Enterprise Development Association - for TechnoPark
- x) Initiate Training & Certification for Project Management, eSecurity, and eStandards

***** Q4 2009 – Oct/Nov/December - LAUNCH AWARENESS & INITIATE PROJECTS**

- i) Public Launch, Press Conference for “Real-Time” Armenia Programme
- ii) Recruit Professional Staff for the eGovernment Programme Office
- iii) Commence “Hand-on” Trans-Government Computer, Software & Security Audit
- iv) Initiate, Design and Deploy the On-Line State Citizen/Business Registry
- v) Negotiate and Secure International Loans & Investment for PPP Ventures
- vi) Promote eGov participation from all Government Ministries and State Bodies
- vii) Start to work with Ministries to further define early eService candidates
- viii) Negotiate PPP Venture for PKI/Certification, as well as eHealth & eEducation
- ix) Establish the StakeHolders Association and Annual eGovernment Conference
- x) Initiate work on new Legislation for eBusiness, eFraud, & Identify Theft.

***** Q1 2010 – Jan/Feb/March - PPP BUSINESS VENTURES**

- i) Launch of the Citizen ID Cards to Government Staff as Beta-Trial
- ii) Start work on the eTax, ePayment and eBudget Programmes
- iii) Set up eGov Cybersecurity commission to review and upgrade eSecurity
- iv) Develop and Issue the Tender Documents for Secure Government Intranet
- v) Launch the NASDAQ-OMX Pilot e-Pensions Beta-Service to Pension Brokers
- vi) Identify Rural and Urban Infrastructure (underground pipelines) for fibre cables
- vii) Continue to define and short-list new eServices for PPP Ventures
- viii) Review plans for “Triple Play” Broadband Network – Digital TV, VoIP, & Internet
- ix) Actively promote eGov/eSoc Programme to overseas investors & enterprises
- x) Work with ICT Cluster to create PPP Venture for Web Services & Portal Operations

*** Q2 2010 – April/May/June - BUILD eSERVICES & eNETWORKS

- i) Decisions on Contractors/Partners for the Secure Government Intranet
- ii) Agree eService Projects with all “high-priority” Ministry & State Body Applications
- iii) eGovernment Programme Office is now fully professionally staffed (20 to 30)
- iv) Quarterly Meetings of the Prime Minister’s eGovernment Steering Council
- v) Consider Armenian Government eGov “RoadShow” to attract investors & partners
- vi) Agree the new Legislation for eBusiness, eFraud, ID Theft and On-Line Crime.
- vii) Launch the Biometric Passports through Beta-Trial to Government Staff
- viii) Full launch of the PKI/Certification and e-Signature/e-Payment Services
- ix) Review options with partners to expand International Broadband Connectivity
- x) Quarterly Meeting of Govt/ICT Cluster via UITE, ITDSC & Stakeholder Association

** 10 Proposed Principles of Armenian eGovernment **

- i) *Open Peer to Peer Network:* All Ministries, State Bodies, Regional Administrations can connect new eService Applications subject to full compliance with the published Armenian eGovernment Interoperability Standards
- ii) *Shared Risk – Shared Reward :* New eServices will be established a joint PPP ventures with resources and investment from the Government. Financial Payback timescales will be service dependant but typically cash positive in 3 to 5 years.
- iii) *Outsource eServices as PPP Ventures:* ALL Government processes and services will be audited and reviewed to check on their suitability for launch as an eService. Staff Resources & Financial Budget will be fully outsourced to the PPP Business Venture.
- iv) *Embedded eSecurity Everywhere:* eServices will only be trusted and safe if cybersecurity is embedded in all aspects of the network & solutions infrastructure.
- v) *Awareness, Education and Training:* New Services & New Technology will only be fully adopted and used by citizens & business through a nationwide awareness, education and training programmes. These will reach all Armenian citizens from schoolchildren, families and pensioners, as well as all SMEs and Enterprises.
- vi) *One Team – One Standard:* eGovernment is a transformational process with ICT as the enabling technology. We’re talking peer-to-peer organizations, all implementing to one agree set of standard. eGovernment is for ALL, enabled by teams.

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- vii) *Focused on Citizens & Business:* It should be remembered that eGovernment really transforms the processes from Government centric to citizen and business focused.
- viii) *Real-Time Project Management:* This challenging 4 to 5 year programme requires strict real-time project management – 24/7 – Issues should be resolved efficiently through open transparent discussion and swift decisions.
- ix) *Compelling On-Line Content:* On-line services require compelling content. Armenia has an excellent track-record in the multimedia graphical arts. These skills should be leveraged for web services design and verticals such as distance learning & training.
- x) *Always implement “Best Practice”:* Within this report I’ve often stressed the importance of adopting “Best Practice”. Armenia has the advantage of being 10 years behind the eGovernment pioneers which means that deployment can be fast and efficient, learning from the mistakes of others. The standards, processes and architectures are all available on-line, and there are “off-the-shelf” eServices that could be localized by Armenian ICT Business Ventures for swift deployment.

Final Words: In conclusion, this Final Report to USAID/CAPS provides a realistic Roadmap and outline Project Plan for “Real-Time” Armenia and the implementation of eGovernment and eSociety over the next 4 to 5 years. However, reaching this challenging goal will require intense teamwork, overcoming some cultural legacy and prejudice. I’ve tried to fully reflect past work, documents and presentations in this report so that the Armenian Government can move beyond “Analysis” to “Construction” and “Engineering” their 21st Century eGovernment & eSociety.

The positive outcomes for the Armenian Government, Citizens & Business will be fourfold:

- i) Improved Economic Growth – GDP – particularly in the ICT Business Cluster.
- ii) Reduced Government Budget through the PPP outsourcing of eServices.
- iii) Improved Lifestyles, including Healthcare, Education & Social Welfare for Citizens.
- iv) “Real-Time” Armenia as a growing regional & international Business Hub for eTrade.

Appendix 1 – Selected Report References and Documents

- 1) AMPS Joint Steering Group Meeting – NASDAQ OMX – e-Pensions – May 2009
- 2) Design Study for an Armenian II Pillar Pension System - NASDAQ OMX – Feb 2009
- 3) European Interoperability Framework for Pan-European eGovernment Services - 2005
- 4) National Competitiveness Report of Armenia – 2008- Economy & Values Research Centre
- 5) Armenian Information Technology Sector – Industry Report - 2008
- 6) Armenian Information Technology Sector – Guide to Armenian IT Companies - 2008
- 7) ITU – Workshop on Broadband Networks – Case Study – Canada - 2003
- 8) ITU – Regulatory Implications of Broadband Networks – Case Study – Malaysia - 2001
- 9) ITU – Workshop on Critical Networks – Korean Case Study - 2002
- 10) ITU – Broadband Korea – Internet Case Study – March 2003
- 11) ITU – The e-City – Singapore Internet Case Study – April 2001
- 12) Business Continuity Guidelines – ASIS - 2005
- 13) Security in a Web2.0 World – A Standards based Approach – Carlos Solari - 2009
- 14) Estonia – The Country with Identification Infrastructure – Tikk and Sarv – June 2009
- 15) Competitive Innovation Funds in Higher Education – World Bank Presentation – June 2009
- 16) National PKI Overview – Presentation from APAGA Technologies / VeriSign – June 2009
- 17) Sustainable eGovSolutions for Armenia – Roland Berger – Presentation – March 2009
- 18) eGovernment in Action – Alexander Beresnev – Hewlett Packard – October 2008
- 19) AVIV Project – Israeli Ministry of the Interior – HP Project Reference - 2008
- 20) Look@World Project in Estonia – Alar Ehandi - 2008
- 21) Identify Solutions Briefing – Frank Zimmermann – HP Consulting EMEA - 2007
- 22) Ericsson Mobile e-ID Solution – Technical Description - 2006
- 23) ICT Development in Armenia - Ericsson – October 2007
- 24) Booz Allen and Hamilton – IT Technology Park and Special Economic Zones – March 2009
- 25) Terms of Reference for the World Bank ICT Infrastructure & Spectrum Studies – June 2009
- 26) eGov Standardisation Framework – Proposal from Central Bank of Armenia – 2006/2007
- 27) Armenian National Government Network – Realising the Vision – Ericsson – Feb 2009
- 28) Electronic ID Cards for Armenia –Vahe Vardanyan – Central Bank of Armenia

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- 29) E-Transformation Turkey Project – March 2005 Action Plan
- 30) Estonian Information Society Action Plan – 2006 to 2013
- 31) The CIO Concept in e-Government – Lessons from Developing Countries – Misra - 2007
- 32) UN E-Government Survey – From e-Government to connected Governance - 2008
- 33) The South Korea Annual e-Government Report - 2006
- 34) Armenian Government Assessment Methodology – Dr Audrey Selian – May 2006
- 35) Armenia e-Development & Competitiveness Enhancement – World Bank – May 2008
- 36) Intel World Ahead – Accessibility Programmes - PC’s for ALL - 2008
- 37) National PC Concept – Hewlett Packard – October 2008
- 38) Survey of eGovernment Services in Serbia – August 2007
- 39) Strategies for the Future of e-Government – J Millard et al - 2004
- 40) E-Government – Singapore - Arun Mahizhnan & Narayanan Andiappan - 2002
- 41) E-Government and Knowledge Management – China – June 2007
- 42) Improving Technology Utilisation in e-Government around the World – Brookings – 2008
- 43) Barriers to e-Government Implementation in Armenia - Dr. Vache Gabrielyan - 2007
- 44) E-Government Interoperability Framework (e-GIF)– UK Government – April 2002
- 45) UK Government Interoperability Framework – Review – MIMAS - March 2005
- 46) Roadmap for E-Government in the Developing World – Pacific Council – April 2002
- 47) E-Government Maturity at Spanish Local Levels – EMCIS – July 2006
- 48) E-Government Interoperability – UNDP – e-Primer for Information Society - 2008
- 49) Bulgaria – e-Government Strategy – 2002
- 50) E-Government Architecture in Jordan – A Comparative Analysis – 2006
- 51) Jordan e-Government Programme and Strategy – - Ministry of ICT - June 2006
- 52) E-Government in Germany – Deutsche Bank Research – June 2005
- 53) Romania – National Strategy for the Implementation of the Info Society – MinICT – 2002
- 54) State Treasure Budget Automation – Hewlett Packard – FMIS – 2007
- 55) Re-Thinking Trust and Confidence in European e-Government – Reinhard Riedl – 2005
- 56) Lithuania – e-Government Concept Development Task Force – November 2000
- 57) US Senate and Congress – e-Government Act of 2002 (189 pages)
- 58) Standards and Architectures for e-Government Applications V2.0 – German Govt – 2003

- 59) E-Government Interoperability – A Review of e-Government by UNDP – 2007
- 60) US Government : e-Government Strategy – February 2002
- 61) Promoting Innovation through Incubation – EIF Experience - Bagrat Yengibaryan
- 62) Information Security Forum – Information Security Standards – November 2007
- 63) UK Government E-GIF – Technical Standards Catalogue V6.2 – Final Version – Sept 2005
- 64) UK E-Government Interoperability Framework – V6.1 - Cabinet Office – March 2005
- 65) UK Transformational Government – Implementation Plan – November 2005
- 66) Gyumri Technopark – Strategic Roadmap and Business Plan – December 2008
- 67) Real-Time Armenia : Securing Government & Financial Enterprises – Probert – Feb 2009
- 68) US Government Federal Enterprise Architecture Framework – V1.1 – August 1999
- 69) Building an IT Society – BOA – Presentation – December 2008
- 70) Chief Security Officer (CSO) – ASIS American National Standard – October 2008
- 71) Operationalization of Universal Services Fund for Armenia – World Bank – June 2009
- 72) E-Society and Innovation for Competitiveness Project (EIC) – World Bank – June 2009
- 73) Review of eGovernment Procurement (eGP) Implementation - World Bank – Sept 2009
- 74) Extremadura – A Successful Example of the use of ICT for Development – May 2009
- 75) SRC Personalised Record Keeping & Unified Income Tax – USAID Armenia – March 2009
- 76) Information Asset Protection Guidelines – ASIS International – 2007
- 77) eGovernance Laboratory – “The Future, Today” – Tallinn, Estonia – 2007
- 78) eGovernment Documentation and Presentations from the NORQ Centre – June 2009
- 79) Crisis Hits Armenia – Global Thinking to Concrete Actions – AMCHAM in Armenia – 2009
- 80) Organisational Resilience: Security & Business Continuity – ASIS International – March 2009
- 81) E-Government Documentation and Presentations from the Mergelyan Institute – June 2009
- 82) Information Security Forum (ISF) Briefing – Information Leakage - October 2007
- 83) E-Government & CyberSecurity for Developing Countries – ITU Telco Division – Aug 2008
- 84) The Impact of e-Government on Competitiveness Growth and Jobs – IDABC – Feb 2005
- 85) Small and Medium Entrepreneurship Sector in Armenia – OSCE – 2008
- 86) Small and Medium Entrepreneurship Support Programme in Armenia – OSCE – 2009

Appendix 2 – USAID/CAPS Task Assignment Worksheet

SCOPE OF WORK

TASK TITLE: Increase business opportunities for the Armenian ICT Cluster through supporting E-Government, E-commerce and E-security development in Armenia

TASK LEADER: Armen Shahbazyan

SCHEDULED START/END: June, 2009

PROGRAM TYPE: Consulting assignment

Objectives:

Support competitiveness of the Armenian ICT Cluster by replicating the success of other countries to address regulatory and market failures in establishing 21st century e-government, e-commerce and e-security operating environments. These are essential not only to developing the domestic market for IT services, and increasing ICT usage among the Armenian government and business community, but also to allow more widespread use of competitive practices via electronic commerce and promotion. This activity seeks to provide an expert to advise a multidisciplinary working group on providing a road map for government and industry adoption of critical practices.

Description / Overview:

Business Background – Armenia is actively developing its ICT Sector for as a mission critical segment of the overall National Economy. As part of the next phase of implementation, the Armenian Government is actively pursuing a strategy to build a national secure high-speed backbone communications network that will support an evolving and diverse range of e-Government, e-commerce applications with an underpinning of a nationwide secure system for all types of transactions, including financial.

On 21st February 2009, Dr. David Probert from VAZA International invited by CAPS project to participate at UITE Meeting Without Ties event, gave a well received presentation and White Paper to the Armenian ICT Leaders Conference on the theme of "Real-Time Armenia" that proposed a pro-active programme to significantly enhance national cybersecurity for both government networks & enterprises. In addition, Dr. Probert recommended extending the Armenian Financial & Trading Networks to form the basis of a global "e-DiasporaNet" that would also boost the ICT Sector, as well as e-Business for Armenian Enterprises, and hence establish Yerevan as a growing regional Hub.

Following the presentation Dr. Probert was invited to meet with the Minister of Economy as well as senior staff within the Central Bank and the Ministry of Labour and Social Issues. The aggressive programme already underway was discussed to establish a dedicated Project Implementation Unit that would manage all aspects of the ambitious and time critical e-Programmes. It is expected that the Prime Minister will sign-off a 15 stage road-map of activity &

deliverables relating to this programme that would underpin the call for international investors and partners such as the World Bank & Major Technology Corporations.

Dr. Probert was asked to review a range of electronic documentation, and based on his experience, to offer advice with regards to the proposed Implementation Road Map, as well as the Technology Architecture, Security, and Public/Private Partnership Investment Programme. Following Dr. Probert’s return to UK, the requested 15 steps Road Map was prepared and submitted to the Ministry:

1. **Project Management:** Appoint PIU – Project Implementation Unit
2. **Technology Platform:** Review and Agree the Technology & Applications Architecture
3. **Investment Models:** Discuss, Agree and Publish the Leveraged PPP Investment Models
4. **Bid Process:** Issue Formal RFP for eGovernment Platform including Investment Options
5. **Cluster Teams:** Establish the primary eGov applications – eHealth, ePensions, eTax, Education, Tourism, Diaspora, Social Security, Justice, Energy, Transport, Environment, and eventually span all Government Ministries during 3 to 5 year implementation plan.
6. **CyberSecurity:** Agree Security Requirements, Policy, Architecture & Disaster Recovery/Business Continuity Procedures
7. **Platform Decisions:** Short-List Technology/Investment Bids – Interview & Agree Finalists
8. **Secure Funding:** Agree PPP Models for winning bids & finalise International funding
9. **Prioritise Clusters:** Appoint & Prioritise the eGov Applications Clusters for implementation. Discuss and Agree the Requirement Specifications as the basis for separate parallel bid process with experienced Armenian & International software/service vendors
10. **Interoperability:** Review & Agree the Data Interoperability Standards & Protocols
11. **eGov Campaign:** Government Announcement of eGov Strategy & Applications
12. **International:** Negotiate International connectivity with International Alliance Partners
13. **Citizen Passports:** Launch internal ID passports including secure Transaction Processing
14. **Operational Net:** Completion of Secure eGov Communications Platform – Spring 2010
15. **Live Clusters:** Phased Launch of eGov Applications Clusters – 3 Monthly Intervals – 2010 to 2014 – eventually spanning all Ministries with around 20 Networked Applications.

This TW summarises a proposed 21-day programme of work that would be undertaken during May 2009 to actively support the multidisciplinary working group and relevant Ministries in the successful initiation, management and implementation of this National e-Government, ecommerce and e-security programme. The STTA will work with the Working Group specifically created to work on the program and make recommendations to it and the GoA.

Proposed Programme – The consultancy 21-Day programme is planned to cover the following project modules:

- a) E-Government & e-Commerce Technology Platform – Applications & Cyber Security (5 Days)
- b) ICT Vertical Cluster Applications Review (5 Days)
- c) ICT International Interoperability e-Government and e-Commerce Standards (3 Days)
- d) ISO/CEC/ISF Security Standards (2 Days)
- e) E-Government Disaster Recovery & Business Continuity Management (2 Days)

f) PPP ICT Investment Models and Technology Vendor Review (2 Days)

g) Final Report & Recommendations to the Armenian Government (2 Days)

Outline Analysis of Impact of Armenian ICT Cluster Competitiveness – A key impact of e-Government Programmes is the dynamic & positive support & growth of the country ICT sector. Below are the expected results of significant investment in e-Government on the ICT market sector, growth and competitiveness during the coming 3 to 5 years:

i. ICT Cluster Benefits: There is extensive international documentation describing the strongly positive impact of e-Government infrastructure & services upon ICT Business. An excellent in-depth EU report on the Impact of eGov on Competitiveness & Jobs is here. An exhaustive Google search will however unearth many such reports highlighting the extremely positive ICT sector impacts & business efficiency improvements from eGov solutions. In fact there are booklets summarising the status of e-Government programmes published for all 34 EU members, EU candidates & EFTA that can be accessed here.

a. Communications Networks: The creation of secure national broadband multimedia networks is a critical catalyst and enabler of growth within the ICT sector. Specifically, the penetration of the broadband internet (cable or wireless) to the citizens opens up a massive new market for on-line e-Government services, e-Commerce, e-Entertainment, e-Gaming, and e-Education . It is important that the Armenian Government insist that whichever national or international vendor installs & manages the backbone networks, that there are Armenian ICT companies within the consortia. Even at the earliest phases of implementation, the Government should ensure & legislate that there is active technology transfer & training between the tender winners (PPP) from Europe/Asia/USA and local Armenian Partners.

b. Vertical Software Applications: There is considerable market potential for the ICT Cluster to develop software applications for each of the targeted e-Government Vertical Clusters such as e-Health, e-Finance, e-Pensions, e-Tax, e-Education, Social Services & On-Line Transactions Processing & Bio-ID Support & Verification. To speed up implementation timescales, in most cases there will be “off-the shelf” applications from overseas vendors. However, these will still need to be modified and adapted to the Armenian Government situation, as well as the considerable technicalities of the Armenian Languages. In the longer term, the ICT Software & Services Sector would be expected to be one of the major beneficiaries of the e-Government Programme with the creation of a diverse range of new entrepreneurial ICT enterprises, possibly located in the new Technoparks in Gyumri & elsewhere.

c. Security Services: All international analysts stress the importance of improving & managing CyberSecurity within the new e-Commerce and e-Government

infrastructure. On-line security is again a key global ICT growth sector in which Armenian businesses are already active. The implementation of the e-Government Network will provide a rich open applications platform that will require real-time embedded security software & services. I’ve discussed the wide scope of e-Security requirements in a far more detailed Security White Paper. Specific opportunities for the Armenian ICT Cluster are: Business Continuity & Disaster Recovery Services, Encryption, RFID & Biometric ID Solutions, DataBase & Server Virtualisation, Secure Cloud Computing Services, In-Depth CyberSecurity Protection (DDoS Attacks, Virus, Trojans, Sleepers), and integrated security operations centres. Finally, there will of course be opportunities for specially licensed private Armenian ICT companies to support the security of the national e-Military & e-Defence Networks, as well as the global network of Armenian embassies & consulates. In summary, the ICT Security Sector is one that Armenian Small & Medium Enterprises may hope to become a growing international player during the coming 3 to 5 years, leveraging its diaspora contacts.

d. Multimedia Content: The availability of a high-speed broadband communications network provides the platform for the delivery of commercial multimedia content, entertainment, information services & gaming to both domestic & business consumers. Increasingly during the next 3 to 5 years, information services will migrate to 3D formats, and there will be an excellent opportunity for entrepreneurial Armenian Businesses to develop the domestic market and expand from webdesign to the next generation of interactive on-line 3D multimedia services.

e. Multimedia Design Studios: The opportunity for the creation of multimedia content is so compelling for the Armenian ICT Cluster. Since the birth of the commercial Internet in the 1990’s the content has moved from the static web pages of Web1.0 to dynamic social networking & photo sites of Web2.0. Now we’re seeing the birth of the next generation of interactive, & adaptive 3D websites such as secondlife.com. In addition there are already thousands of online TV Channels on sites such as wwitv.com including Armenian TV from California! as well as the compelling & addictive content on channels such as youtube.com. The new platform will open up the market for such creative content including interactive e-Government TV & educational broadcasts, distance learning, virtual tourism, and other multimedia on-line e-Gov citizen services. The advanced content will be delivered on the full spectrum of fixed & mobile devices from PC, laptop, PDA and 3G mobile phone. Specific added-value from the Armenian ICT Cluster will be the multilingual & creative graphical design skills that will also be indirectly leveraged through the “Real-Time Armenia” Programme. In summary, multimedia content, & creative graphical design will provide the foundation for another potential ICT

growth sub-sector supported by the e-Government Network & Vertical Clusters. Such developments have proven invaluable in other countries to building the local market for ICT services.

f. Integrated ICT Solutions: On-line e-Government Services and e-Commerce applications require extensive integration of both “off the shelf” open source software, with customisation for the specific Armenian Government requirements. The linguistic requirements will ensure that this is a captive market for the Armenian ICT Cluster with the opportunity for both Government & Enterprise funded contracts during the coming 3 to 5 years.

g. ICT Solutions Export Potential: It is intended to liaise and work closely with the Ministry of Diaspora during the Programme to strongly leverage the global Armenian network of ICT Business expertise. ARMTECH Forums, as well as UITE and other Associations are included in the Programme discussions through dedicated workshops & seminars. Armenian Business should be encouraged to bid for the major tenders, either alone or within multi-national consortia. As already mentioned, the aim is to optimise the ICT technology & expertise transfer from international corporations to the Armenian ICT SME (Small & Medium Enterprise) Cluster, including in-depth solutions training.

h. Leverage the Diaspora: This topic is covered several times in this document since it is one of the key economic strengths of the Armenian Global Community. The establishment of the national e-Government network will serve as the potential hub for its extension to become an *international* trading network for Diaspora Businesses. This would become an attractive opportunity for international investment, again in the guise of the PPP model that would further boost the skills & scope of the ICT Cluster. Indeed such an e-Gov extension would generate ICT software & service export sales to both the major countries of the Armenian Diaspora and beyond!

ii. ICT Cluster Growth: Based upon experience in other national e-Government and e-Commerce Projects in UK, Eastern Europe, and Georgia, **the expectation is that the Armenian ICT Cluster would achieve incremental competitive growth of between 7% to 10% compound growth each year, which over 5 years would be an overall 40% to 60% growth in ICT Market Sector Size.** The growth in new jobs will be roughly pro-rata, with an emphasis on certified software & service specialists, though not necessarily with University Degrees. In addition, there will be increasing requirements for ICT sales, & marketing specialists to develop both national & international ICT Business, again leveraging the power of the Armenian Diaspora. In fact an excellent model for ICT development is the Israeli High-Tech industry based around the University Business Parks, and small ventures around Tel-Aviv, Haifa & Jerusalem. The Israeli Government &

Community have been extremely successful in leveraging the full strength of the worldwide Diaspora during the last 20+ years. The Israeli e-Government Programme during the last 5 years has certainly strengthened this economic model. Armenia should now consider emulating this economic model through the creative combination of e-Government, e-Security and leveraging & growing ICT through the global Diaspora.

iii. ICT Regulation & Policy: The creation of the e-Government and e-Commerce infrastructure will also demand the establishment of common open standards & regulations for network connectivity, data exchange, security, privacy and data protection.

The creation and implementation of such standards will certainly enhance both the national & international competitiveness of the Armenian ICT Cluster since the world is now demanding open standards & transparency. In addition, the implementation of the backbone network & multimedia content will require the Government to establish new laws regarding acceptable end-user content, media copyright as well as trans-border data transmission for reasons of national Armenian Defence & Security. So the e-Government infrastructure will act as the catalyst that will strengthen & synchronise the entire Armenian ICT community, boosting its confidence, market share, income & jobs.

iv. Real-Time Regulation: A natural outcome of the Programme will be the ease with it will be possible to monitor and regulate processes within each market & Government sector starting with Finance, Pensions, Tax and Customs, and then with extensions to Health, and Energy. ICT Businesses will be able to develop & install real-time monitoring applications as the basis of next generation Business Intelligence (BI) Data Warehouses that transform Government Statistics from static tables & pie graphs to actual real-time data. Again, this ICT sector, sometimes referred to as BI2.0, is fast developing in USA/Europe and support for the e-Gov network will accelerate the rate at which the Armenian ICT Cluster becomes fully competitive through the creation of leading edge BI2.0 Government Solutions.

v. Measuring the Information Society: Measuring the impact of e-Government & IT Services is already a new intellectual discipline, and the ITU has already organised a worldwide conference on Measuring the Information Society in Geneva – May 2008. The experience to date of e-Government Programmes around the world is that they catalyse & even demand significant growth in the ICT Business Cluster. Within this programme for Armenia, the objective will be to maximise these benefits through teaming ICT companies with western contractors for pro-active technology transfer, in-depth training. The planned outcome is that Armenian ICT Business will fully take over 100% of ICT managed services, systems operations and software upgrades following completion of each e-Gov applications module.

vi. Impact on e-Commerce development

Development of e-Government in Armenia will have a strong impact on development of e-Commerce. The launch of e-Government services supposes increase in accessibility of eservices for the population and businesses through making infrastructure and PCs more

affordable (up to 70% according to Government ICT Development Strategy). This will boost e-Commerce development as more services will be both offered and purchased electronically also offering opportunities for Diaspora.

vii. ICT Impact Summary: It will be appreciated that since e-Government has not yet even achieved its 10th anniversary, that the precise benefits & impacts are not yet fully measured. However, this proposed programme for the Government of Armenia can guarantee that the overall impact of the e-commerce, e-Security and e-Government Programme will have extremely strong benefits for the national ICT Cluster, with an estimated 7% to 10% incremental annual compound growth. In order to achieve such positive results it will be necessary for the Ministry of Economy & Government to manage the project such that there is continuous technology exchange, training and learning within the implementation team. The intention to promote the Programme as a Public-Private Partnership will also have a strongly positive impact upon the motivation of the contractors & the project success. To be realistic, the ICT impact should be measured over a project lifespan of 3 to 5 years.

Fit with CAPS Objectives:

- _ I-3.1 Support policy analyses and advocacy efforts to encourage adoption and implementation of key policy reforms
- _ I-3.3 Support policy/regulatory reform initiatives to improve Armenia’s rankings with respect to key competitiveness and doing business indicators
- _ I-3.5 Support the research, design and development of e-government, e-democracy, ecommerce solutions for RA Government and private sector – effectively providing specific support in the implementation of ICT strategy activities

The activities will contribute to the following outcomes:

- _ Successful passage of e-signature law and adoption of regulations enabling e-government and e-commerce applications
- _ Government approval and adoption of policy reforms in key areas
- _ Recognized improvements in selected doing business and competitiveness indicators, significant improvements in Armenia’s position in WB and WEF rankings
- _ Adoption of new policies to support innovation in IT field

Tasks:

1. Help to finalize the e-Government RoadMap
2. Help to evaluate proposal for e-Government / e-Commerce ICT Platform architecture
3. Advise on vertical e-Government / e-Commerce Applications Clusters
4. Help MinEconomy to select models for the Government ICT CyberSecurity platform architecture & security policies
5. Help Working Group to establish appropriate training courses on international ICT & ISO/IEC/ISF Security standards for ICT Staff

6. Review the specific vendor proposals for both the e-Government / e-Commerce ICT platform, the vertical applications clusters, and suggest possible models.
7. Prepare a concise final report summarising all the programme activities, deliverables and recommendations for the next programme steps during 2009/2010.

Deliverables:

The following top-level modules will be delivered through the 21-day consultancy programme:

- i. e-Government / e-Commerce RoadMap** – The complete programme will be reviewed with respect to timescales, and the sequence of primary tasks sequenced and prioritised. The complete roadmap will then be finalised & documented within an on-line Project Spreadsheet.
- ii. ICT Architecture Backbone Communications Network** – Support the Ministry in reviewing & evaluating proposals for the e-Government / e-Commerce ICT platform architecture, including submitted vendor proposals. Then make recommendations on the design, technology standards, communications protocols, servers, databases, information backup and disaster recovery.
- iii. ICT Applications Clusters** – In-depth discussions will be scheduled with each of the top priority vertical e-Government Applications Clusters which will include e-Health, e-Pensions, Social Security, e-Tax, Education and Tourism. I’ll work with each cluster team to review appropriate “off-the shelf” e-Gov applications software from software & service vendors.
- iv. ICT CyberSecurity** – Assist the Ministry on proposing models for the Government ICT CyberSecurity platform architecture & security policies taking into account the related requirements of operational resilience, business continuity, privacy and security training.
- v. ICT Standards & Interoperability** – Discuss international ICT & ISO/IEC/ISF Security standards, and work with the PIU to establish appropriate training courses for ICT Staff. Also review existing published Government Interoperability Standards such as those from the USA (Federal Enterprise Architecture - FEA), UK (e-Government Interoperability Framework – eGIF), and Europe (European Interoperability Framework – EIF).
- vi. PPP ICT Investment Models & Vendor Review** – Discuss the project ICT funding requirements & potential investment models with senior staff within the Ministry of Economy & Armenian Central Bank. Review the specific vendor proposals for both the e-Government ICT platform, the vertical applications clusters, and suggest possible models.
- vii. Final Report & Recommendations** – Following the 21-day consultancy programme, I’ll prepare a concise final report summarising all the programme activities, deliverables and recommendations for the next programme steps during 2009/2010, including a summary article for the CAPS Website.

Appendix 3 – UK Technical Standards Catalogue – V6.2

The full technical standard catalogue is 58pages, and can be downloaded by clicking the title link. Here I list the contents page to give some idea of the comprehensive coverage of eGIF standards.

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* Also downloadable directly from : www.govtalk.gov.uk/documents/TSCv6.2_2005_7_14_final.pdf *

Appendix 4 – “Real-Time” Armenia – Original Concept Paper – February 2009

* The White Paper can be downloaded directly from : www.valentina.net/vaza/ARMENIA.pdf *

(1) **Current Armenian Security Situation – Economic, Electronic, Physical & Political:**

Electronic Security will be critical to all aspects of the growing Armenian Economy, Enterprises and Government during the coming months & years. It is an honour to speak at this important international meeting of Armenian ICT Leaders and I offer this White Paper as my personal thoughts and project proposal on this key topic. Every country has a very specific national profile both regarding physical & electronic security so let’s summarise the main issues & concerns:

- ✚ *Overview of specific security threats including political, criminal, terrorist & natural causes:* Armenia is physically positioned in a region that has various unresolved political issues going back almost 20 years. In addition the proximity to certain Middle Eastern Countries such as Iraq, Syria and Lebanon also boosts the need for Armenia to upgrade both physical & e-Security. Close to Yerevan is the aging Metsamor Nuclear Power Station based upon the Soviet Type VVER440 reactors which despite reaching the end of their original planned life still pose a residual national security risk. And of course this week – 7th December – is also the 20th anniversary of the tragic Gyumri Earthquake which destroyed so many lives, & resources.
- ✚ *Importance of e-Security to the Sustainable Growth of the Armenian Economy:* Increasing proportions of global business is being conducted electronically on the Internet, whilst most Governments are migrating citizen services such as taxation, vehicle licences, land registry, & related services to on-line applications that both reduce costs & speed up delivery & cash flows. Later in this White Paper I propose that Armenia extends e-security through a Project that I’ve provisionally code-named the **“Electronic Diaspora”**. Now is the time & opportunity for Armenia to leverage the strength & scope of its worldwide Diaspora as a stealthy, secure & profitable response to the global financial crisis. All business & trade is built upon trust, so e-security needs to be embedded at the heart of the proposed electronic Diaspora trading network.
- ✚ *The value of implementing a distributed security network spanning government & enterprises:* Security cannot be delivered in a box! It needs implemented at all levels of both government & enterprise networks. Every data centre, router, network link, mobile device needs to be secured according to the applications, information and risks related to their use. This paper recommends that Armenia gives serious consideration to significantly upgrading its security through a Government – Enterprise Partnership that develops e-security policies, – and works closely with State Bodies & Major Enterprises on their step-by-step implementation over 2 to 3 years.

In summary, this Security White Paper focuses upon the practical project steps required to upgrade Armenia’s ICT Infrastructure to support a fully secure and resilient “Real-Time” 21st C e-Armenia. linked with on-line trading enterprises of the proposed global network of the “Electronic Diaspora”!

.....* The Presentation can be downloaded directly from : www.valentina.net/vaza/eARMENIA.pdf *.....

Professional Profile: Dr David E. Probert – VAZA International – www.vaza.com

- **Computer Integrated Telephony (CIT)** – Established and led British Telecom’s £25M EIGER Project during the mid-1980s’ to integrate computers with telephone switches (PABX’s). This resulted in the successful launch of CIT software applications for global telesales operations.
- **Blueprint for Business Communities** – Visionary Programme for Digital Equipment Corporation during late-1980’s that included the creation of the “knowledge lens” and “community networks”. The Blueprint provided the strategic framework for Digital’s Value-Added Networks Business that secured significant contracts for enterprise networks.
- **European Internet Business Group (EIBG)** – Established and led Digital Equipment Corporation’s European Internet Group for 5 years, from 1994 to 1999. Projects included support for the national Internet infrastructure for countries across EMEA as well as major enterprise, government & educational Intranet deployments. David was a member of the Trans-European Board for Academic & Research Networking (TERENA) for 7 years (1991 → 1998)
- **KolaNet** – Established and led the KolaNet Project for Nuclear Security within the Arctic Kola Peninsula. The 5 year multi-national project (1992 - 1997) provided Real-Time Internet based monitoring, Training & Web Sites to Government Institutions within Russia & neighbouring countries. The primary KolaNet Applications were the monitoring of radioactivity from the Kola NPP, sea borne reactors as well as other harmful industrial chemicals & heavy-metal emissions.
- **Supersonic Car (ThrustSSC)** – Worked with Richard Noble OBE, and the Mach One Club to set up and manage the 1st Multi-Media and e-Commerce Web-Site for the World’s 1st Supersonic Car – ThrustSSC – for the World Speed Record – Feb 1995 to Oct 1997.
- **Secure Wireless Networking** – Business Director & Vice President for Madge Networks. He launched a comprehensive portfolio of innovative & secure wireless Wi-Fi IEEE802.11a/b/g networking products with advanced technology partners from UK and Taiwan.
- **Networked Enterprise Security** - Appointed as the New Products Director (CTO) to the Management Team of the Blick Group plc with overall responsibility for 55 professional security & software engineers & a diverse portfolio of hi-tech security products.
- **Republic of Georgia** – Senior Security Adviser – Appointed by the European Union to investigate and then to make recommendations on *all* aspects of IT security, physical security and Business Continuity Plans & Disaster Recovery relating to the Georgian Parliament.

Dr David E. Probert is a Fellow of the Royal Statistical Society. He has a 1st Class Honours Degree in Mathematics (Bristol University) & PhD from Cambridge University in Self-Organising Systems (Evolution of Stochastic Automata) & features in “Who’s Who in the World” – 2007 / 2009.