

Information Technology:

Armenian Progress in Infrastructure, Education, and Business

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LEFT BRAINED GEEKS

- **Infrastructure: IT resource availability and impact on society**
- **Education: contributions at primary, secondary, tertiary levels**
- **Business: current and potential future investment outcomes**
- **Summary**

- **Data Awareness: Technology's importance to the average Armenian**
- **Fiber Optic Backbones**
- **Points of Presence: Fixed and mobile access**
- **Terminals: Institutional and personal availability**
- **Mobile Wars: Competition among wireless operators**

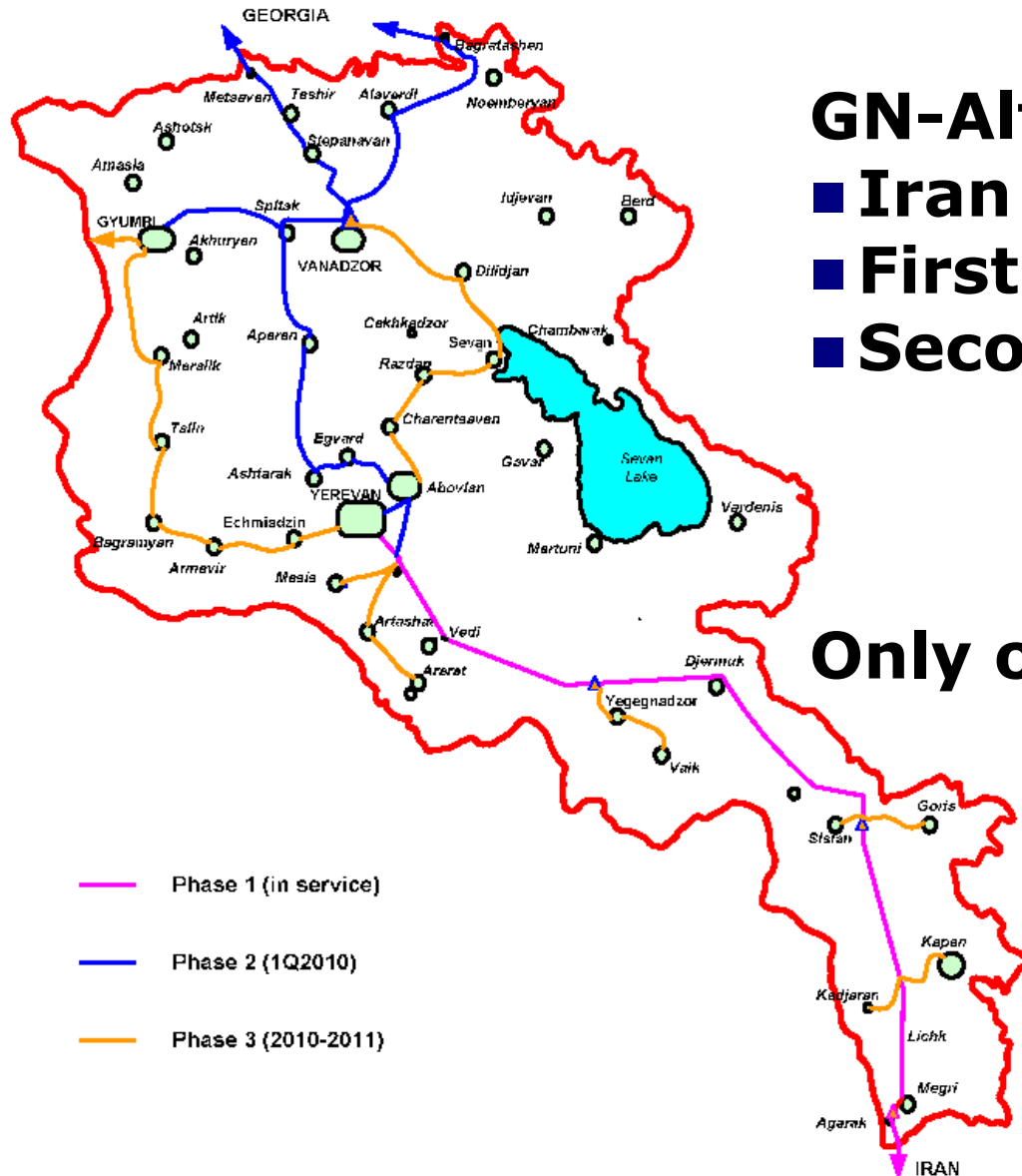
Data Awareness

- **Varies based on age level:**
 - Gen X and Y (< 25) are “connected”
 - Older workers (30-50) may use part time
 - Retirees (55+) not at all
- **Contrast with first world experience:
Grandma emails digicam pics**
- **Devices are expensive:**
 - Digital camera 2-3x more in absolute cost
 - Computer up to 4x for same capability
- **Substantially less disposable income:**
 - Average salary ~100,000 AMD/176 hours
 - Less than \$2/hour
 - Compare this with US minimum wage

Fiber Optic Backbones

- **Yerevan metro area dual ring**
- **Multiple international routes:**
 - **Route 1 via Georgia**
 - **Route 2 via Iran**
 - **Route 3 also via Georgia**
- **Multiple providers at metro and international levels**
- **Regional access sparse but available**

Fiber Optic Backbones (Cont)



GN-Alfa Network Backbone

- Iran link complete
- First Georgia route soon
- Second next year

Only one of multiple carriers

Points of Presence

- **DSL via Beeline (former Armentel)**
 - **1 Mbps DLS @ 40,000 AMD / Month**
 - **No “per unit” data use charge**
 - **4x more expensive than US absolute cost**
- **3G via VivaCell USB Modem**
 - **15 GB @ 19,900 AMD / Month**
 - **In line with US absolute cost**
- **Corporate Data Access**
 - **1 Mbps down/0.25 up @ 180,000 AMD / Month**
 - **2 Mbps bidirectional @ 360,000 AMD / Month**
 - **In line with US T1 pricing**
- **Absurdly high as percentage of income**

- **Private Access**
 - International ex-pats have computers, laptops
 - Average home has no computer
 - Some students have computers
- **Public Access**
 - 500 AMD / Hour
 - Includes net access
 - Printing 20-50 AMD / page
- **3G, smartphone deployment just starting**
- **Traditional cell phone universal**
 - Skype popular data add on
 - Ad-hoc data 70 AMD / megabyte

- **US market:**
 - **300,000,000 people**
 - **Five major carriers (AT&T, Sprint/Boost, T-Mobile, Verizon, Metro PCS)**
 - **60,000,000 subscribers / carrier**
- **Armenian market:**
 - **2,900,000 people**
 - **Three carriers (Beeline, VivaCell, Orange)**
 - **966,667 subscribers / carrier**
- **WiMax available in Yerevan metro**
- **Orange starting WiFi in regions**

- **Informatics Education in Public Schools: disconnect between policy and funding**
- **Three Degrees of Separation: University education at regional, national, and international campuses**
- **Bribery and Corruption: How professors live on 200 USD per month**
- **Half Will Leave: The unfortunate plans of the country's brightest**
- **Apprenticeship: Why education begins at work**

Public Informatics Education

- **The good:**
 - **Ministry of Education has decent curriculum**
 - **Age appropriate, Armenian textbooks printed**
 - **Covers fundamentals and higher level skills**
- **The bad:**
 - **No actual funding of program**
 - **Teachers not trained to deliver curriculum**
 - **Headmasters against students using computers**
- **The ugly:**
 - **Excellent program is in place now**
 - **But not being delivered to students**
 - **Equipment first or last class, but not between**

University Education

- **International:**
 - **AUA excellent master's level programs**
 - **Affordable for US students to study in Armenia**
 - **In-country not affordable without subsidy**
- **National:**
 - **YSEU, SEUA good bachelor's level programs**
 - **One-third the cost of AUA**
 - **Affordable for top 25% of income earners**
- **Regional:**
 - **Branches are not up to par**
 - **SEUA Gyumri still uses Pascal, no Java**
 - **Tuition 66-75% of national branch**

Bribery and Corruption

- **Average IT professor salary: 70,000-90,000 AMD / Month**
- **Below national average salary**
- **Pay for grades model**
- **Consequences:**
 - **Armenian degree means nothing**
 - **4.0 student may be worse than 3.0**
 - **Three, six month work trials**

Half Will Leave

- **Half of Armenia's IT sector university graduates will not stay in-country**
- **Remaining half "not fit" to perform IT work without additional experience, training**
- **Difficult for firms to find qualified people**
- **Loyalty a problem during boom times**
- **Result not unique to Armenia: India and US face a similar problem**

Apprenticeships

- **Does your five year old Facebook?**
- **Major difference between first and second world youth growing up:**
 - **First world poor have decent IT public education**
 - **Second world rich have to teach themselves**
- **A feudal practice can help:**
 - **Get education through available university**
 - **Work a low level job to build skills**
 - **Functions like our intern programs**
- **Sound business planning must take apprenticeships into account**

- **Ω is Not the Answer: Why open borders are crucial to IT business development.**
- **Don't Give, But Loan or Invest: Successful methods of achieving business objectives in a humanitarian manner**
- **Industry Characteristics: Key firms and segments**
- **Partner Teams: The difference between positively and negatively achieving objectives**
- **Entrepreneurship: Technology business opportunities for all Armenians**

IT is Not the Answer

- **Armenians do not consume IT services**
 - Cash-based society
 - Majority of accounting is paper-based
- **Sector depends on international customers**
- **Lax rule of law and civil society progress unattractive to foreign direct investment**
- **Armenia does not have good relations with any of its four neighbors**
- **Regional economic development:**
 - Requires open borders *and* minds
 - Best method to seriously develop economy

Don't Give But Loan Or Invest

■ **Gifts:**

- **Armenia is a developing country that needs work, not hand-outs**
- **Diaspora return on investment far lower compared to China, India, others**
- **Donations not monitored per World Bank**

■ **Loans, Investment:**

- **AUA TRDC program more effective when training charged, loan must be repaid**
- **There is a 4-5x multiplier for direct employment compared with average US high-tech salaries**
- **Expecting repayment increases caliber and quality of recipient**

Industry Characteristics

- **120 active enterprises**
- **4000 people employed**
- **Average programmer salary 3600-7200 USD**
- **Annual production volume 55-60 M USD**
- **98% of work exported**
- **1.7% GDP share**
- **Volume grew 12% annually until 2008-2009**

Partner Teams

- **Most successful IT businesses involve serious partnerships**
- **Examples:**
 - **SEUA / Synopsys**
 - **GTZ / KfW**
 - **AUA / TRDC**
 - **VivaCell / Regional education**
- **International co-operation advantages:**
 - **Safe customs and tax avoidance**
 - **Long-term professional expertise**
 - **Increased funding during recession**

Entrepreneurship

- **Two markets for IT businesses: domestic and export**
- **Off-shoring model successful but requires committed investors, management**
- **Domestic service to exporters smaller revenue and risk**
- **Examples:**
 - **Pharmaceutical databases**
 - **Armenian “Geek Squad”**

- **IT is shaping Armenia's future**
- **Resource prices dropping although cost still relatively high**
- **Required infrastructure in-place**
- **Willing workforce given right opportunity**
- **Many partners willing to help**
- **Investment in Armenia experienced high net growth Jan 1 2000 to Dec 31 2009**