# Measuring WSIS target 10: Estimating internet users

## When only less-than-ideal data is available

Rohan Samarajiva, Roshanthi Lucas, Helani Galpaya, Shazna Zuhyle

Presented by Helani Galpaya

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# WSIS target 10: bringing ICTs within reach of a majority of the world's population

- Four indicators:
  - Mobile subscriptions
  - Mobile use
  - Internet use by household
  - Internet use by individuals
  - [Note: 3 more business indicators added later (since WDTR 2010) ]
- Data collected and reported for all
- Our Focus: Indicator 4 (Internet Use by Individuals)
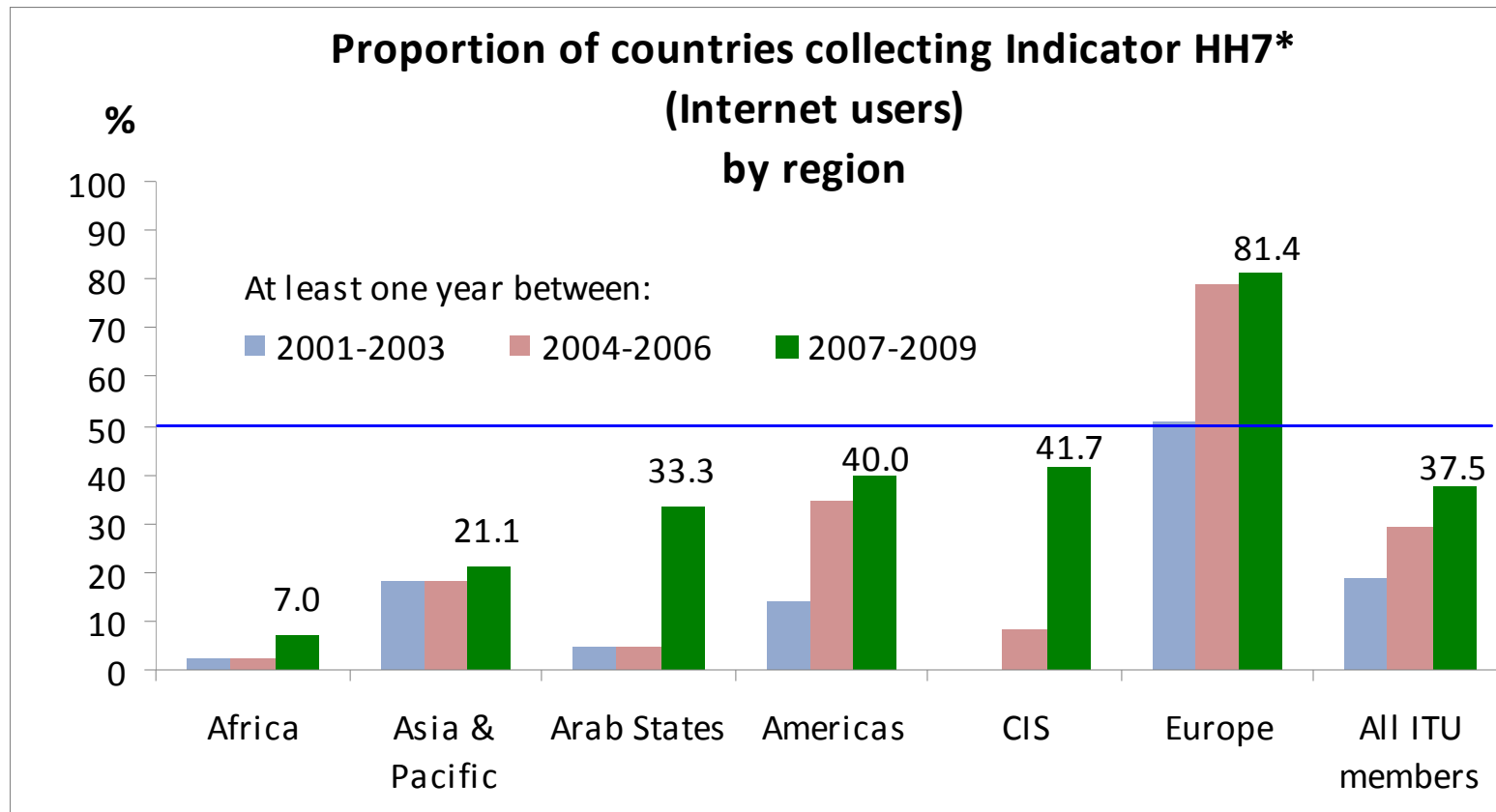  - Can the method for <u>estimating</u> be improved?

**Focus of this presentation**

# The ideal way to measure

# Surveys (household and individual), carried out by NSO

- Best method – collect HH7 through surveys
  - HH7: Proportion of Individuals who use the internet (from any location) in the last 12 months
  - Special survey, using ITU model questionnaire or other
  - Include question in multi-purpose household survey, HHIES (HH income-expenditure survey), ALS (Agriculture & Labor survey) or similar
- Second best - at least collect HH6 through survey
  - HH6: proportion of households with internet access
  - through official survey
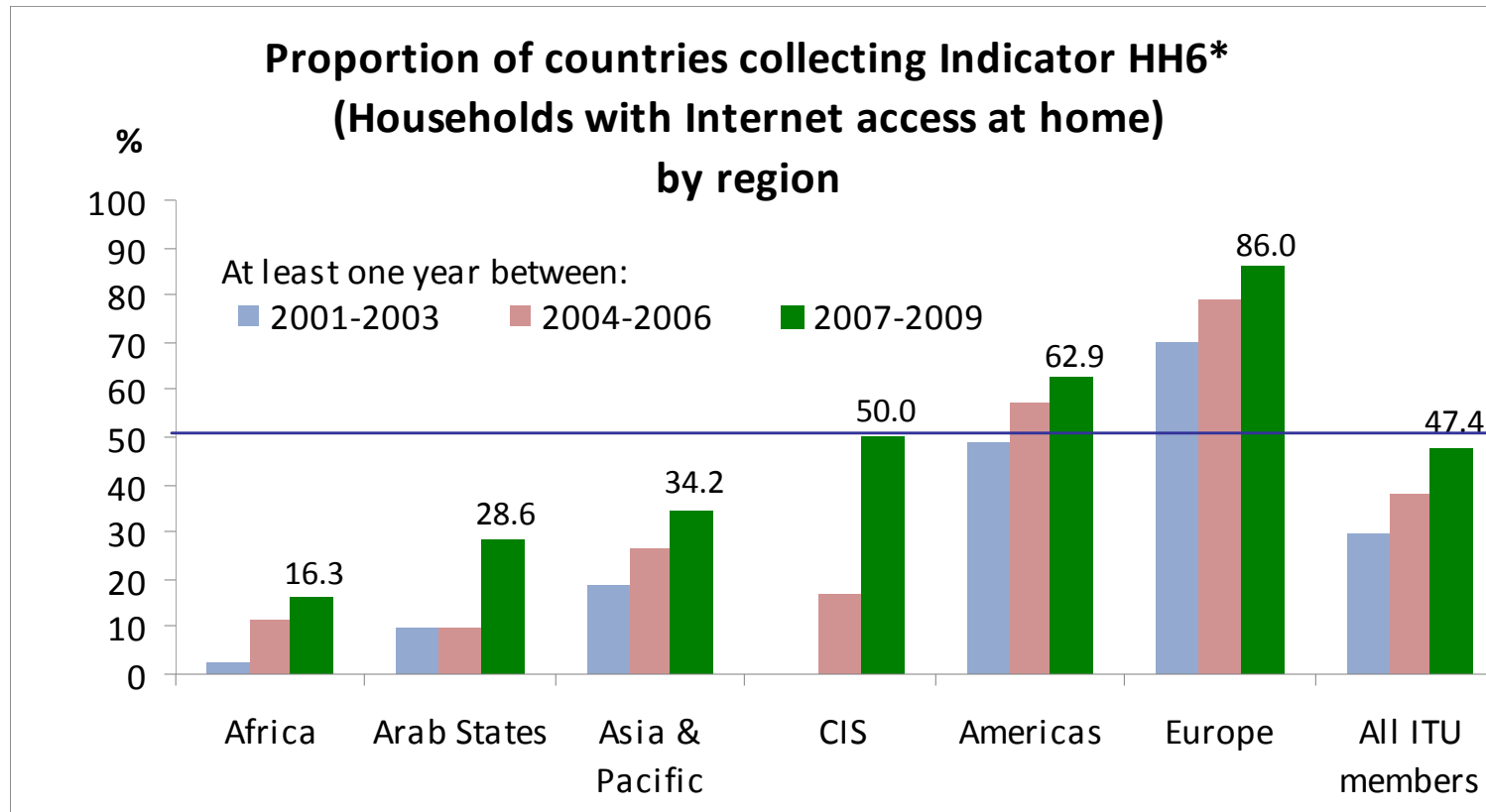  - Use this to estimate number of individual users

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# Not all countries collect HH7 through surveys. But an increasing number do

**Proportion of countries collecting Indicator HH7***
**(Internet users)**
**by region**

%

At least one year between:
- 2001-2003
- 2004-2006
- 2007-2009

| Region | 2007-2009 value |
|--------|-----------------|
| Africa | 7.0 |
| Asia & Pacific | 21.1 |
| Arab States | 33.3 |
| Americas | 40.0 |
| CIS | 41.7 |
| Europe | 81.4 |
| All ITU members | 37.5 |

*Source: ITU World Telecommunication/ICT Indicators database.*

*Note: * Data in this chart refer to countries that have collected data on the number of households with Internet access at home through official national surveys*

# Slightly more countries collect HH6 through surveys, and the number is increasing

**Proportion of countries collecting Indicator HH6***
**(Households with Internet access at home)**
**by region**

At least one year between:
- 2001-2003
- 2004-2006
- 2007-2009

Africa: 16.3
Arab States: 28.6
Asia & Pacific: 34.2
CIS: 50.0
Americas: 62.9
Europe: 86.0
All ITU members: 47.4

*Source: ITU World Telecommunication/ICT Indicators database.*

*Note: * Data in this chart refer to countries that have collected data on the number of households with Internet access at home through official national surveys*

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# In the absence of survey data, estimate based on supply-side data

# Various methods can be used to estimate the number of Internet users

- **Internet Users = Multiplier  x  Internet Subscriptions**

  Where

  - The multiplier = a number used to reflect that each subscription is used by more than one individual (e.g. at kiosks)

  - Internet subscriptions = internet subscription of all types (speeds, technologies etc. )

    - Wired, wireless etc.

  - Above then cross checked with other evidence to report (e.g. if HH access data available, Users > HH access number must be true, etc. )

# But counting total subscriptions (specially wireless) is not straightforward

- Difficulties in counting wireless Internet subscriptions
  - Over-counting (counting all "internet-capable" SIMs, irrespective of use)
  - Under-counting (being able to only count SIMs that have subscribed to a data package; SIMs with only voice packages may use internet, but operators cannot count; impossible for pre-paid)
- General difficulty with multiple ownership (one user with fixed and many SIM connections) leading to questionable multipliers
- Therefore, **for now**, rely on fixed internet subscriptions only

# Difficult to find rationale for current multipliers

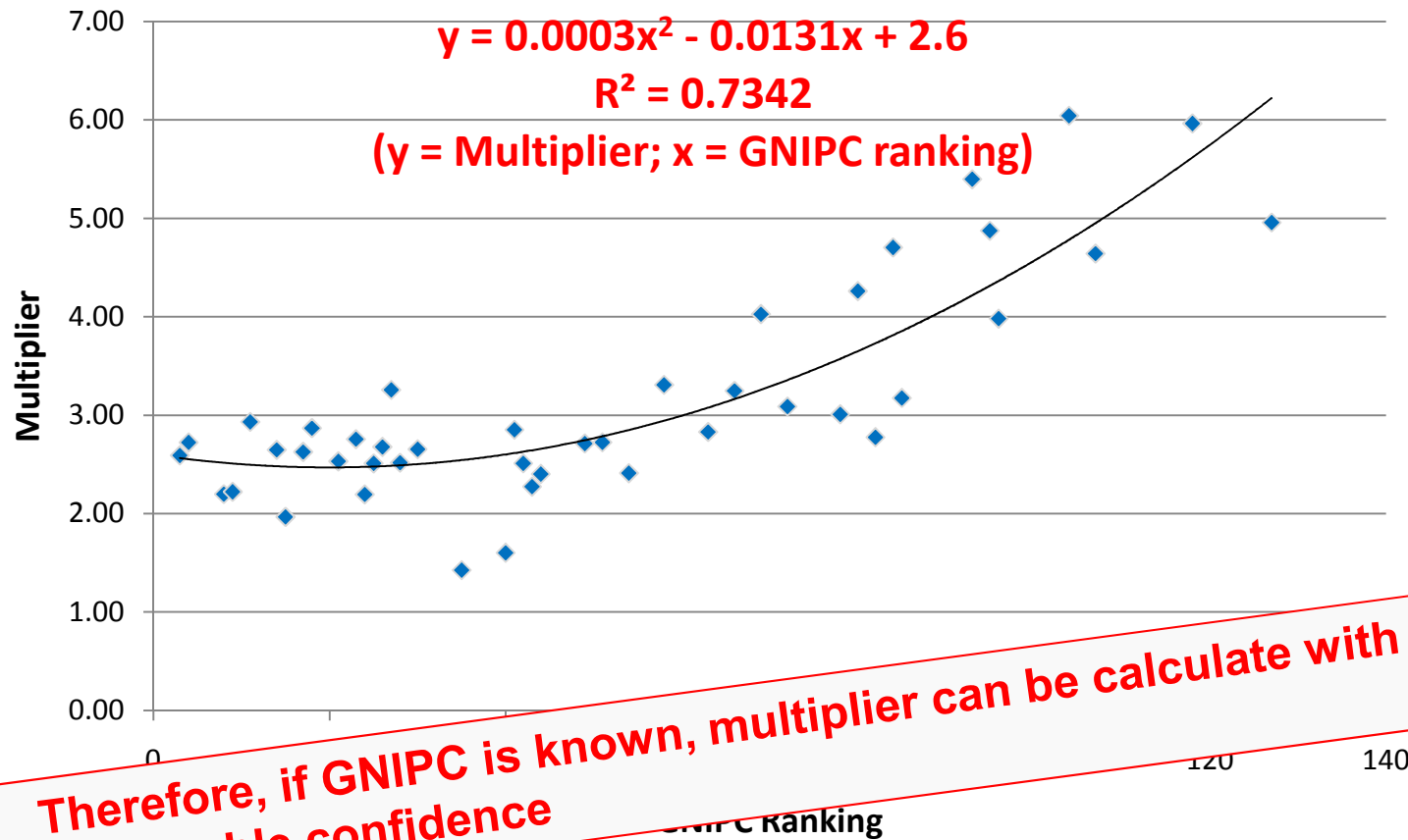| Country | GNI per capita (Atlas Method) Ranking | Population (000s) (from ITU data) | Fixed Internet Subscriptions (000s), 2009 | Fixed Internet Subs per 100 inhabitants 2009 | Internet Users (000s), 2009, current method | Internet users per 100 inhabitants 2009 (current method) | Current multiplier |
|---|---|---|---|---|---|---|---|
| Russia | 77 | 140,864 | 88,068 | 62.52 | | | |
| Mauritius | 88 | 1,288 | 224 | | | | |
| Liberia | 211 | | | | | | |
| Liechtenstein | | | | | | | |
| | | | | | | | 1.42 |
| | | | | | | | ….. |
| | | | | | | | ….. |
| Côte d'Ivoire | 167 | 20,000 | 18 | 0.09 | 968 | 4.84 | 53.78 |
| Sudan | 160 | 40,091 | 44 | 0.11 | 4,200 | 10.48 | 95.24 |
| Iraq | 146 | 31,000 | 3 | 0.01 | 325 | 1.05 | 104.84 |
| Uganda | 193 | 33,333 | 30 | 0.09 | 3,200 | 9.6 | 106.67 |
| Kenya | 180 | 42,000 | 8 | 0.02 | 3,996 | 9.51 | 475.65 |
| Afghanistan | 202 | 28,169 | 2 | 0.01 | 1,000 | 3.55 | 500 |

**Huge variance in Multipliers: 0.68 (Russia) to 500 (Afghanistan)**

- **"Similar" countries with very different multipliers**
  - Afghanistan - 2,000 fixed subscriptions; 202nd GNI ranking; Multiplier=500
  - Burundi - 5,000 fixed subscriptions; 213th GNI ranking; Multiplier=13

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**Proposed modest improvement: a "more rational" way to determine the multiplier**

# Hypothesis: Multiplier (M) is inversely correlated to income

- More people in developing countries likely to access the Internet at tele-kiosks, schools, places of work
  - All with one subscription → multiple users features
  - M>1 and large
- In more developed countries, most households likely to have internet access at home
  - M>1, but smaller than low income countries
- In developed countries, one user can have many subscriptions (mobile phone, even two fixed broadband etc.)
  - M positive, by could be M<1

# Using available data (mostly high income countries), hypothesis appears valid



y = 0.0003x² - 0.0131x + 2.6
R² = 0.7342
(y = Multiplier; x = GNIPC ranking)

Multiplier

GNIPC Ranking

- **Therefore, if GNIPC is known, multiplier can be calculate with reasonable confidence**

# Recommendation: Step 1: If survey is available, us it since surveys produce most reliable data

- If survey from current year is not available, use previous year's data with adjustment
  - Adjust by average growth for country grouping (e.g. middle income countries etc.)

# Step2: If survey data is not available, use formula to calculate multiplier and use multiplier as a ceiling

- Formula: y = $0.0003x^2$ - 0.0131x + 2.6
   Where
   – y = M, the multiplier
   –x is GNI per capita ranking
- As more and more countries (specially low income countries) conduct surveys, formula can be fine-tuned → better estimates for everyone
   –Current data yields M>1
- Most recent available data to be used always
- If current multiplier > formula-derived one
   –Use formula derived multiplier to calculate num. of users
- If current multiplier < formula-derived one
   –Use current multiplier to calculate num. of users

# Results: minor adjustments in a few high income countries

| Country | GNI per capita (Atlas Method) Ranking | Current Internet Users (000s) 2009 | Current Multiplier | Multiplier using new methodology | Internet users with new methodology | Variance of number of Internet users (000) | Actual Survey Results where available | Internet Users that can be reported (000s) |
|---|---|---|---|---|---|---|---|---|
| Monaco | 1 | 23 | 1.84 | 2.59 | 32.34 | 9 | | 23.0 |
| Liechtenstein | 2 | 23 | 1.38 | 2.58 | 43.01 | 20 | | 23.0 |
| Norway | 3 | 4,431 | 2.59 | 2.56 | 4,383.93 | -47 | 4,431.0 | 4,431.0 |
| Luxembourg | 4 | 425 | 2.72 | 2.55 | 398.49 | -26 | 425.0 | 425.0 |
| Bermuda | 7 | 54 | 1.42 | 2.52 | 95.65 | 42 | | 54.0 |
| Denmark | 8 | 4,751 | 2.20 | 2.52 | 5,437.86 | 687 | 4,751.0 | 4,751.0 |
| Switzerland | 9 | 5,480 | 1.98 | 2.51 | 6,950.24 | 1,470 | 6,158.0 | 6,158.0 |
| Kuwait | 10 | 1,100 | 3.89 | 2.50 | 707.50 | -393 | | 707.5 |
| San Marino | 12 | 17 | 2.62 | 2.49 | 16.17 | -1 | | 16.2 |
| United Arab Emirates | 13 | 3,778 | 2.68 | 2.48 | 3,495.23 | -283 | | 3,430.8 |
| Netherlands | 14 | 14,872 | 2.65 | 2.48 | 13,914.66 | -958 | 14,872.0 | 14,872.0 |
| Sweden | 15 | 8,398 | 1.97 | 2.47 | 10,560.05 | 2,162 | 8,398.0 | 8,398.0 |
| United States | 17 | 239,894 | 2.93 | 2.47 | 202,036.99 | -37,857 | 215,208.0 | 215,208.0 |
| Austria | 18 | 6,144 | 2.87 | 2.46 | 5,276.17 | -867 | 6,144.0 | 6,144.0 |
| Belgium | 21 | 8,113 | 2.53 | 2.46 | 7,882.30 | -231 | 8,113.0 | 8,113.0 |
| Ireland | 23 | 3,043 | 2.76 | 2.46 | 2,715.75 | -327 | 3,043.0 | 3,043.0 |
| France | 24 | 44,625 | 2.19 | 2.46 | 50,047.75 | 5,422 | 44,625.0 | 44,625.0 |
| Australia | 25 | 15,757 | 2.50 | 2.46 | 15,513.75 | -243 | 15,809.0 | 15,809.0 |
| Iceland | 26 | 302 | 2.67 | 2.46 | 278.03 | -24 | 302.0 | 302.0 |
| Germany | 27 | 65,124 | 3.26 | 2.47 | 49,354.00 | -15,770 | 65,124.0 | 65,124.0 |
| Canada | 28 | 26,225 | 2.45 | 2.47 | 26,475.45 | 251 | 26,960.0 | 26,960.0 |

# Results: adjustments in all low income countries; some significant

| Country | GNI per capita (Atlas Method) Ranking | Current Internet Users (000s) 2009 | Current Multiplier | Multiplier using new methodology | Internet users with new methodology | Variance of number of Internet users (000) | Actual Survey Results where available | Internet Users that can be reported (000s) |
|---|---|---|---|---|---|---|---|---|
| Mali | 184 | 250 | 24.75 | 10.36 | 104.68 | -145 | | 104.7 |
| Cambodia | 185 | 78 | 4.33 | 10.46 | 188.33 | 110 | | 78.0 |
| Bangladesh | 188 | 617 | 4.12 | 10.76 | 1,613.88 | 997 | | 617.3 |
| Burkina Faso | 190 | 178 | 10.48 | 10.96 | 186.32 | 8 | | 178.2 |
| Guinea-Bissau | 190 | 37 | 53.00 | 10.96 | 7.67 | -29 | | 7.7 |
| Rwanda | 193 | 450 | 3.04 | 11.27 | 1,665.07 | 1,215 | | 450.0 |
| Uganda | 193 | 3,200 | 106.67 | 11.27 | 337.97 | -2,862 | | 338.0 |
| Central African Rep. | 195 | 23 | 9.04 | 11.47 | 28.68 | 6 | | 22.6 |
| Gambia | 196 | 130 | 37.17 | 11.58 | 40.52 | -90 | | 40.5 |
| Mozambique | 196 | 613 | 45.37 | 11.58 | 156.29 | -456 | | 156.3 |
| Nepal | 196 | 626 | 6.05 | 11.58 | 1,198.20 | 572 | | 625.8 |
| Togo | 196 | 356 | 5.98 | 11.58 | 689.98 | 334 | | 356.3 |
| Madagascar | 200 | 320 | 38.55 | 12.00 | 99.60 | -220 | | 99.6 |
| Afghanistan | 202 | 1,000 | 500.00 | 12.22 | 24.43 | -976 | | 24.4 |
| Niger | 204 | 116 | 32.19 | 12.43 | 44.76 | -71 | | 44.8 |
| Ethiopia | 206 | 445 | 6.26 | 12.65 | 899.61 | 454 | | 445.4 |
| Eritrea | 207 | 250 | 35.71 | 12.76 | 89.35 | -161 | | 89.3 |
| Malawi | 209 | 716 | 6.82 | 12.99 | 1,363.67 | 647 | | 716.4 |
| Liberia | 211 | 20 | 1.33 | 13.21 | 198.20 | 178 | | 20.0 |
| Burundi | 213 | 65 | 13.00 | 13.44 | 67.21 | 2 | | 65.0 |

# Result: overall 8% reduction in the number of Internet users across reporting countries; small increase in digital divide

- Brings down the numbers for many developing countries that used very high multipliers
  - E.g. Afghanistan (500 → 12.22); Kenya (475 → 9.98);  Uganda (106 → 11.27)
- Small increase in the digital divide

|  | Internet users/100 (current methods), 2009 | Internet users/100 (new method), 2009 |
|---|---|---|
| Developed countries | 65.46 | 61.92 |
| Developing countries | 20.64 | 15.57 |
| Digital divide (Internet users) | **3.17: 1** | **3.98:1** |

- But when wireless Internet subscriptions grow, and data are included in future iterations, an increase in the calculated total user numbers and a reduction in the digital divide can be expected (since new wireless users are expected to come disproportionately from developing countries)

# Drawbacks of proposed method

- Does not account for wireless subscriptions
  - Should yield smaller multipliers over time as wireless is included in the future.
- Leaves out most unreliable (wireless subs) but still assumes fixed subscriptions data is reliable
  - Further tests required (next iteration)
- Nearly all data used to derive formula is from developed countries (few developing countries have conducted surveys)
  - Possibly skews the multiplier (mobile a lion's share of developing country Internet subscriptions)
  - Only solution is for more developing countries to conduct surveys
- Still only an estimate, albeit one grounded on plausible logic
  - Not a substitute for survey data
- Multipliers always greater than 1
  - Because wireless data is left out ?
  - And because double counting occurs when wireless is included?

# Thank you.

> Work in progress

> Feedback to improve methodology requested. To: helani@lirneasia.net

> Draft of paper containing individual country calculations available at www.lirneasia.net