CHAPTER 2. 2012 STATE OF THE FUTURE INDEX
GLOBAL PROGRESS AND NATIONAL APPLICATIONS

The State of the Future Index is composed of several indicators to help understand and illustrate the overall outlook for the future—whether the future seems to be improving and how different factors are affecting it. Research on this measure began in 2000, first on a global scale and then on national and regional levels. SOFIs have been constructed for several countries, including Azerbaijan, China, East Timor, Kuwait, South Africa, Turkey, and selected countries of the Americas. The Azerbaijan SOFI was computed over the past year, and some highlights are included in this chapter.

SOFI's computation was further developed in 2012 and a new global SOFI has been constructed. Box 2 presents the variables included in the computation of the 2012 SOFI.

Box 2. Variables included in the computation of 2012 SOFI

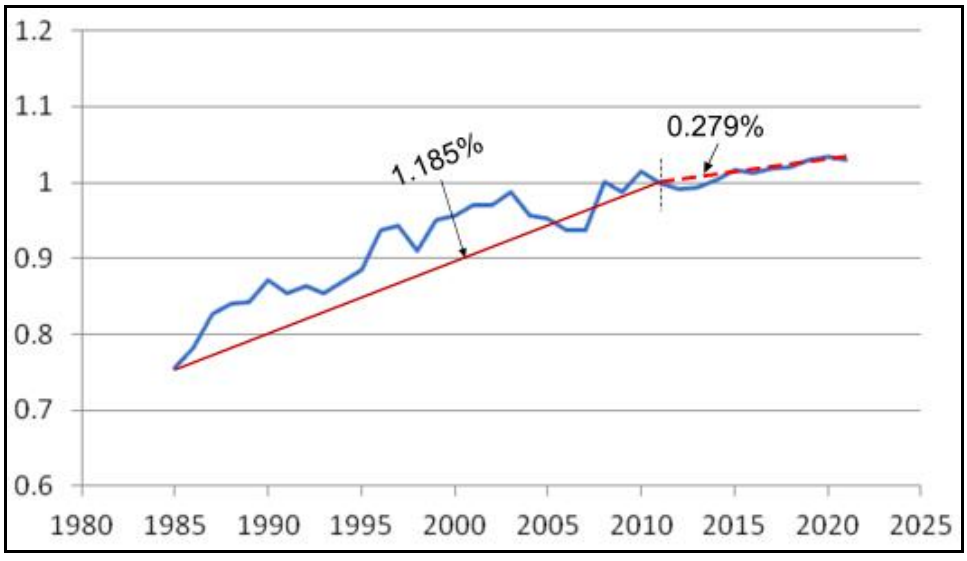
1. Population with access to improved water sources (% of national population)
2. Literacy rate (% above 15)
3. Levels of corruption (on a scale 0=highly corrupt to 10=very clean)
4. School enrollment, secondary (% gross)
5. Poverty headcount ratio at $1.25 a day (% world population)
6. Number of countries and groups that had or still have intentions to build nuclear weapons
7. Total greenhouse gas emissions (10^6 kt)
8. Unemployment, total (% of world labor force)
9. Energy efficiency (GDP/ energy)
10. Number of wars (more than 1000 killed)
11. Population growth (annual %)
12. R&D expenditures (% of GDP)
13. People killed and injured in terrorist attacks
14. Electricity production from renewable sources (% production)
15. Prevalence of undernourishment
16. Freedom rights (Country Score) (1= most free to 7 least)
17. Ecological footprint / Biocapacity ratio
18. GDP per capita (constant 2000 US$)
19. Voter turnout (% voting population)
20. Physicians (per 1,000 people)
21. Internet users (per 1,000 people)
22. Infant mortality (deaths per 1,000 births)
23. Forest lands (% of national land area)
24. Life expectancy at birth (years)
25. Seats held by women in national parliament (percent of members)
26. Economic income inequality (share of top 1%)
27. Total debt services (% of GNI)
28. Prevalence of HIV (% of population age 15 and 49)

There were some important developments in the computation of the 2012 SOFI compared to earlier SOFIs produced by The Millennium Project. These included:

- Some of the original variables were replaced with newer variables.
- A Real Time Delphi was conducted to collect fresh expert judgments about the best and worst expectations for the SOFI variables and probabilities of selected developments that could impinge on the variables.
- Historical data were updated, new series were inserted when old series were discontinued, new curve fit equations were derived, and new interpolations were made for missing data.
- The developments included in the Trend Impact Analysis were revised, the list updated, and the likelihood and impacts reassessed or changed based on the RTD results.
- The effect of choice of equations used for the extrapolation of the variables was studied as an effective way of simulating global scenarios within the SOFI context. Best and worst estimates from the RTD were used to help resolve the question of which extrapolation to use.
- "Sparkline" sketches of the variables and the extrapolations were included in the Excel spreadsheets that serve to compute the SOFI to help visualize the parameters.

The baseline SOFI that resulted from the use of the new data sets for the variables is shown in Figure 41. This figure does not include consideration of the effects of the 90 developments that were examined later using TIA.

Figure 41. 2012 State of the Future Index



A one-to-one comparison with the SOFIs prepared in earlier years would be meaningless since the set of variables has changed. But overall, the shape of this year's SOFI is similar to earlier SOFIs: more rapid growth in the past 20 years, then a leveling and growth at a lower rate in the next 10 years, but rising nevertheless. The growth rate between the 1985 SOFI estimate

and 2011 is 1.185% and between 2011 and 2021 the rate is 0.279. The data sources and extrapolations are available in the full version or SOFI section on The Millennium Project website: www.millennium-project.org.

One can observe that SOFI does not show growth between 2008 and the present, probably because of the global financial situation, as reflected in the decrease of global GDP/capita and the increasing global unemployment. It actually begins growing again only in 2017.

The resulted SOFI curve also raises this question: what caused the drop in SOFI in the period 2003 to 2008? A closer examination of the changes reveals that a number of variables experienced negative changes during that period, but the greatest impact came from the newly added variable measuring the income gap, "Economic income inequality (share of top 1%)," which doubled from earlier values. At the same time, R&D expenditures and electricity production from renewable energy sources also dropped during that period, while the number of people killed or injured in terrorist attacks rose. There were also positive changes during that period, of course, but they were not strong enough to balance the negative influences, particularly the downward pressure of the income gap.

This reveals one of the greatest advantages of computing SOFI: identifying the variables that affect the overall change and how they are changing themselves; in other words, where is humanity making progress (winning) or regressing (losing), or which areas do not change much or have an unclear trajectory. Figures 42, 43, and 44 are graphical representations of these changes.

Where is humanity winning?

- Access to water (% pop.)
- Internet users (per 1,000 people)
- Literacy rate (% pop above 15)
- GDP/capita (constant 2000 US$)
- Life expectancy at birth (years)
- Women in parliaments (% of members)
- School enrollment, secondary (% gross)
- Energy efficiency (GDP/energy)
- Poverty $1.25 a day (% world population)
- Population growth (annual %)
- Infant mortality (per 1,000 births)
- Undernourishment prevalence
- Wars (> 1000 deaths)
- Nuclear proliferation
- HIV prevalence (% pop 15-49)

Where is humanity losing?

- Total debt (% of GNI)
- Unemployment (% of world labor force)
- Income inequality (share of top 1%)
- Ecological footprint / biocapacity ratio
- GHG emissions (10^6 kt)
- Terrorist attacks victims/1000
- Voter turnout (% voting population)

Where is there no significant change or change is not clear?

- Corruption
- Freedom rights (country score)
- Electricity from renewables (% production)
- Forest lands (% of national land area)
- R&D expenditures (% of GDP)
- Physicians (per 1,000 people)

Figure 42. Where humanity is winning

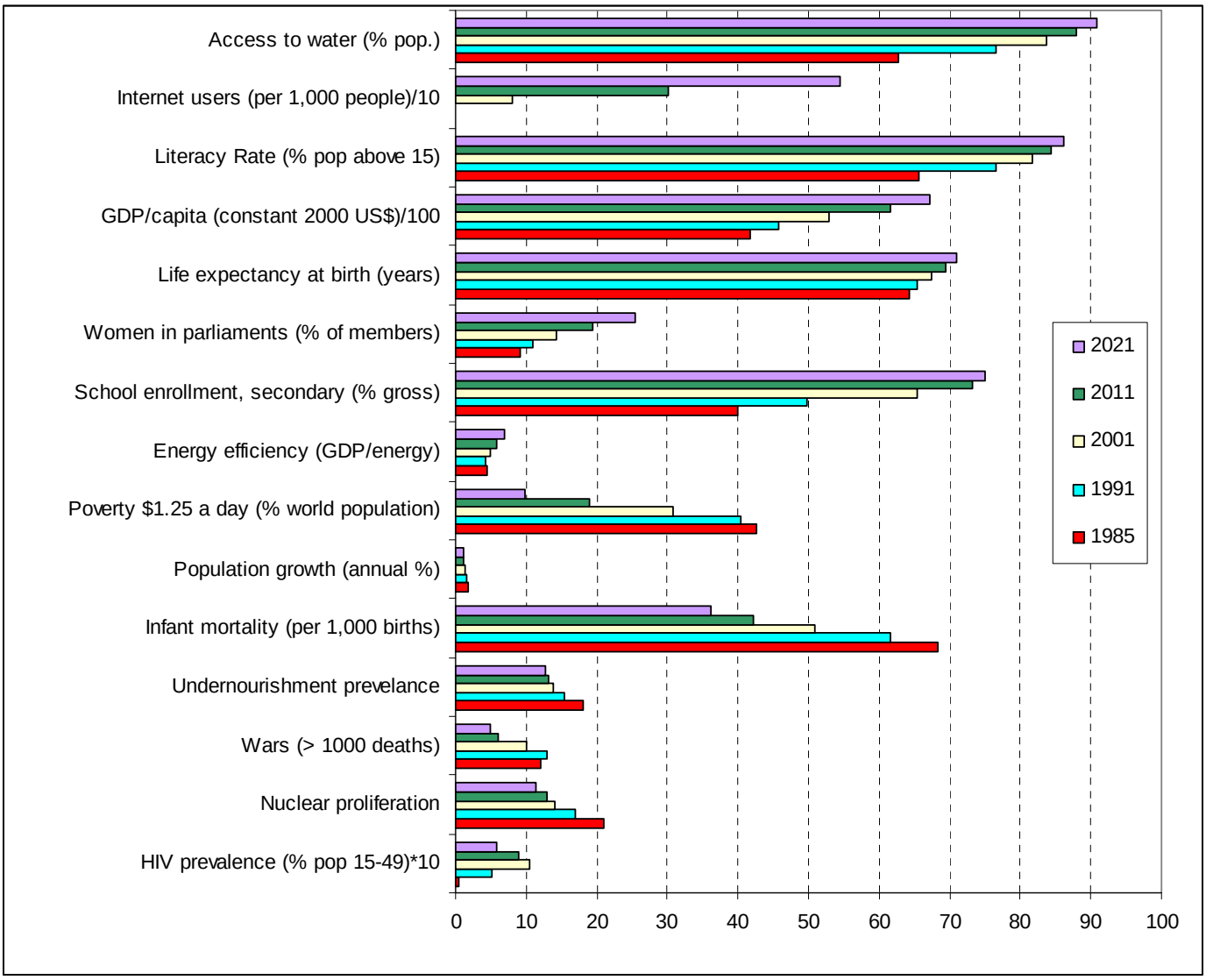


Figure 43. Where humanity is losing

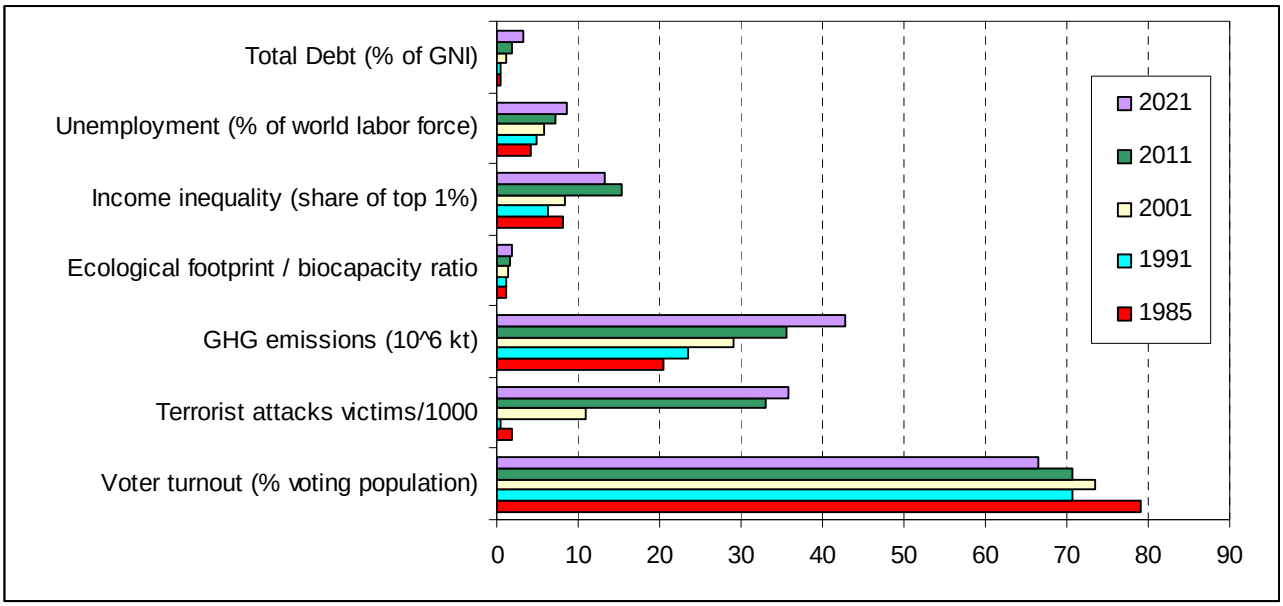
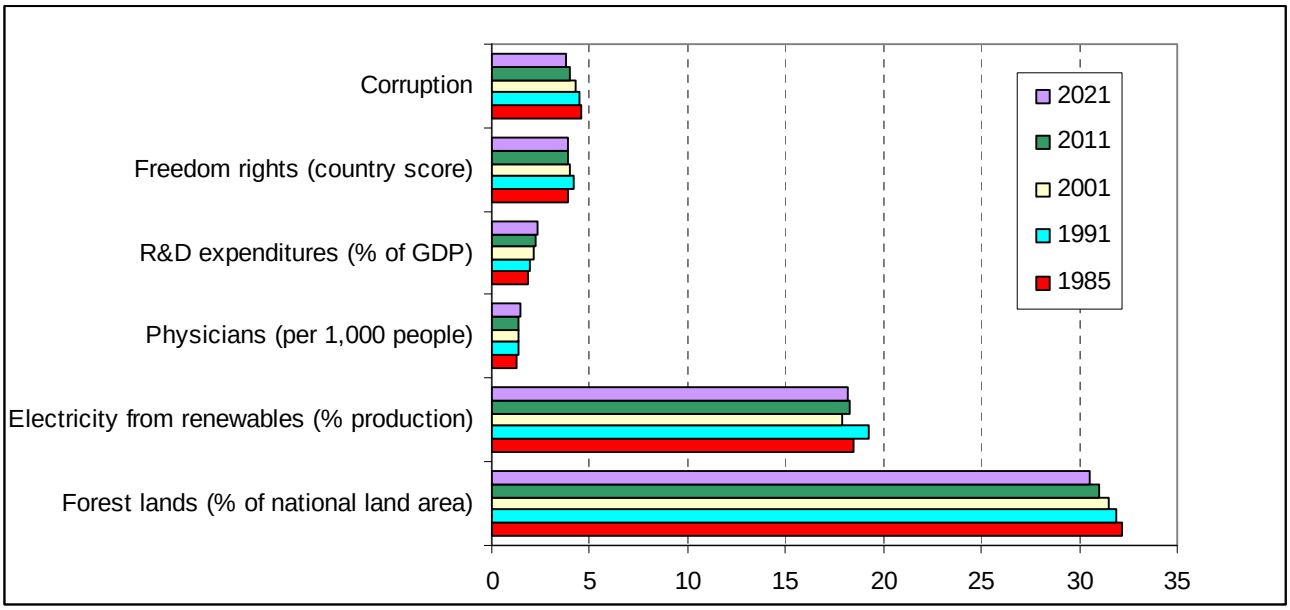


Figure 44. Where there is no significant change or change is not clear



The 2012 SOFI computation used judgments from the Millennium Project's 2012 SOFI Real-Time Delphi that involved global expert panels that provided judgments about the best and worse expectations for the variables 10 years ahead, as well as judgments on their weight in the computation of the overall SOFI. Table 1 summarizes the results.

Table 1. Summary of the estimates for "best" and "worst" values of the SOFI variables, and their suggested weight for the computation of the index

	Variable	Best 2017	Worst 2017	Weight
1	**Population with access to improved water sources (% of national population)**	92.07	83.59	81.77
2	**Literacy rate (% above 15)**	92.21	85.01	78.42
3	**Levels of corruption (on a scale: 0=highly corrupt to 10=very clean)**	3.28	4.52	72.57
4	**School enrollment, secondary (% gross)**	81.24	70.07	75.20
5	**Poverty headcount ratio at $1.25 a day (PPP) (% of world population)**	14.56	25.26	72.40
6	**Number of countries and groups that once had or still have intentions to build nuclear weapons**	10.33	20.14	70.04
7	**Total greenhouse gas emissions (10^6 kt)**	35.73	47.83	76.20
8	**Unemployment, total (% of world labor force)**	7.32	11.59	78.31
9	**Energy efficiency**	6.13	5.69	68.02
10	**Number of wars globally in which more than 1000 people were killed**	15.81	29.76	71.08
11	**Population growth (annual %)**	1.03	1.26	70.67
12	**R&D expenditures (% of GDP)**	2.75	2.10	68.21
13	**People killed or injured in terrorist attacks**	10,819.51	20,410.46	63.76
14	**Electricity production from renewable sources (% of total electricity production)**	26.83	19.65	73.55
15	**Prevalence of undernourishment**	9.98	12.49	72.94
16	**Freedom rights index by Freedom House (country score, 1 to 7)**	3.26	4.19	70.59
17	**Ecological footprint to biocapacity ratio**	1.54	1.88	73.30
18	**GDP per capita (constant 2000 US$)**	8,950.30	7,029.08	66.64
19	**Voter turnout (% of total legal voting population)**	72.30	58.94	62.69
20	**Physicians (per 1,000 people)**	1.65	1.33	63.47
21	**Internet users (per 1,000 people)**	678.51	447.97	72.46
22	**Infant mortality (deaths per 1,000 live births)**	25.68	40.11	70.16
23	**Forest lands (% of national land area)**	31.73	26.85	67.34
24	**Life expectancy at birth (years)**	89.93	69.51	67.10
25	**Seats held by women in national parliament (% of all national members)**	29.07	19.36	66.94
26	**Economic income inequality**	11.36	15.49	69.31
27	**Total debt service (percent of GNI)**	1.49	2.20	66.08
28	**Prevalence of HIV (% of national population between the age of 15 and 49)**	0.47	0.84	58.16

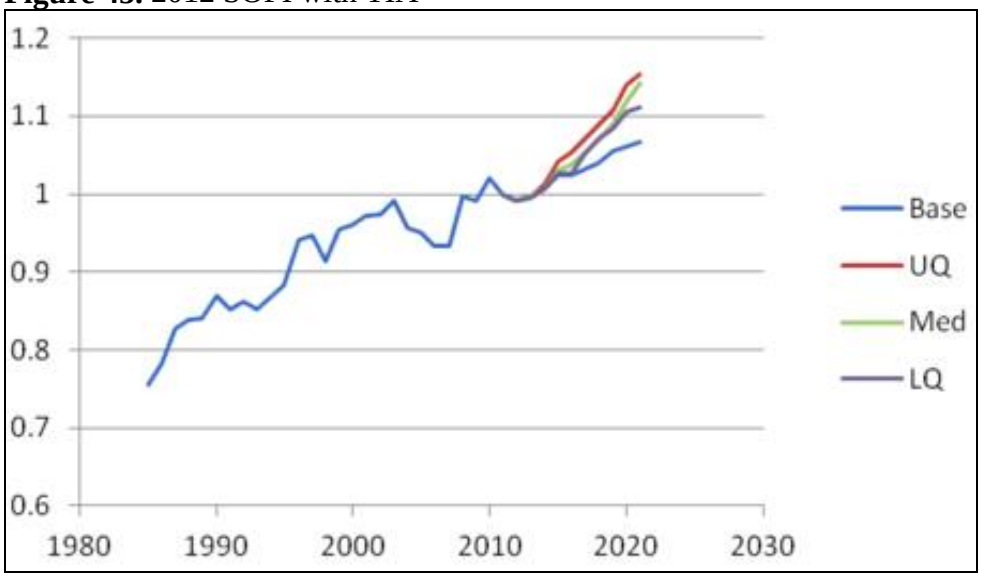
The 2012 RTD also included 21 developments that the panelists were asked to address, particularly to judge probabilities of occurring. Space and time limited the number of developments assessed in the RTD, but since the SOFI can accommodate many more, additional developments were derived from last year's SOFI and other sources. For the RTD items, the average panel's judgments for probabilities were used. For the other developments, the probabilities and impacts were assigned by the staff. The developments rated by the RTD panel and their respective probability of occurring by 2021 were:

- New technologies used in detecting criminal behavior; new surveillance micro cameras, psychological profiles, etc. (61.39)
- Major computer fraud discovered and leads to introduction of certain controls on content and usage of Internet (58.70)
- Accelerating economic development in China and India results, for example, in increase of the CO_2 burden by 20% (52.38)
- Global climate change causes, for example, frequent floods in some regions, polluting the water, and drought in other regions; makes water 5% less available on the whole (51.12)
- Transnational organized crime grows to 8% of the global economy (50.25)
- Production increases from high tech agriculture including biotech crops, improved irrigation and soil conservation, gains of 10% in productivity (49.31)
- Impoverished countries borrow 20% more from rich countries as a result, for example, of rising energy prices (48.10)
- Economic expansion of at least 5% from new fields such as applied nanotechnology (46.80)
- Reforms in the European financial structure (such as the issuance of Eurobonds and effective functioning of the European Financial Stability Facility) result in financial stability in the region and avoid defaults by any nation (45.54)
- Organized crime funds major terrorist activities (45.33)
- Invention and commercialization of new types of arms and surreptitious detection devices used to interdict terror activities (43.18)
- Social programs in many countries (including programs to support the growing elderly population) impede GDP/cap growth rate by 5% (42.75)
- Global economic depression resulting in drop of GDP per capita by 15% (41.94)
- Policies to stop terrorism reverse the trend toward liberalization of civil liberties in the majority of countries (41.51)
- Cost-effective desalination or other techniques increase safe water supply by 20% globally (38.86)
- A nuclear accident such as Three Mile Island or Fukushima causes many nuclear nations to de-nuclearize (37.71)
- Emergence of new, politically powerful Islamic leaders who effectively promote and encourage multicultural respect (34.54)
- A pandemic of the scale of HIV/AIDS (32.55)

- Implementation of effective means for limiting production and proliferation of weapons of mass destruction (28.89)
- Conversion of significant desert areas into green lands, adding 5% to global arable lands (28.14)
- Terrorists contaminate water supplies; supplies remain unusable for decades (27.07)

The baseline assumptions were used in a TIA to produce the SOFI forecasts shown in Figure 45. The favorable growth in the forecasted SOFI is certainly a result of the assumptions made about the impacts of the developments.

Figure 45. 2012 SOFI with TIA



TIAs were also generated for each of the variables. They were shown in the previous section on the Global Challenges and are all available in the full version of this study, Chapter 2.5

Analyzing the impact of developments individually and how changes of their forecasts might affect the whole SOFI could be an extraordinarily valuable exercise for policymaking and strategy design. It would allow identification of the events that could have high positive (or negative) impacts and how that would play into the general potential futures. Therefore, based on the promise of the work accomplished to date, we believe that SOFI can become a very useful national planning tool.

This year's exercise illustrated the sensitivity of SOFI to the choice of alternative extrapolation baselines. Therefore, integrating the RTD and SOFI could help, using an expert panel's judgments in making the choices. Additionally, the automation of the TIA process, which is important but tedious, would facilitate fast assessment of choices.

Other remaining work includes providing reliable and recent historical data for use in the SOFI calculations, investigating the use of the Index in sectoral applications (e.g., a nano technology or an energy SOFI), and systematically introducing planners to the tool.

* * *

National SOFI

The Millennium Project helped Azerbaijan compute its first national State of the Future Index (AZ-SOFI). The study was conducted by the Azerbaijan Future Studies Society. It aimed to identify the variables that are relevant for the Azerbaijani future, the availability of data, the developments that will have most significant impact on the future of Azerbaijan, and the potential trajectories of those developments. The final purpose was to contribute to the strategic planning process for the future of Azerbaijan.

The AZ-SOFI is an assessment of the 10-year outlook of the future (2011–20) based on 20 years of historical data and 10-year forecasts of 20 key variables. The index is intended to show the directions and intensity of change. It also provides a mechanism for studying the relationships among the variables and the developments analyzed.

A set of 24 developments and 20 variables were initially selected by a Core Expert Group and then assessed by a larger group of experts through an online questionnaire using a Real-Time Delphi. The survey was conducted in October 2011 and involved the participation of over 100 experts from 13 countries.

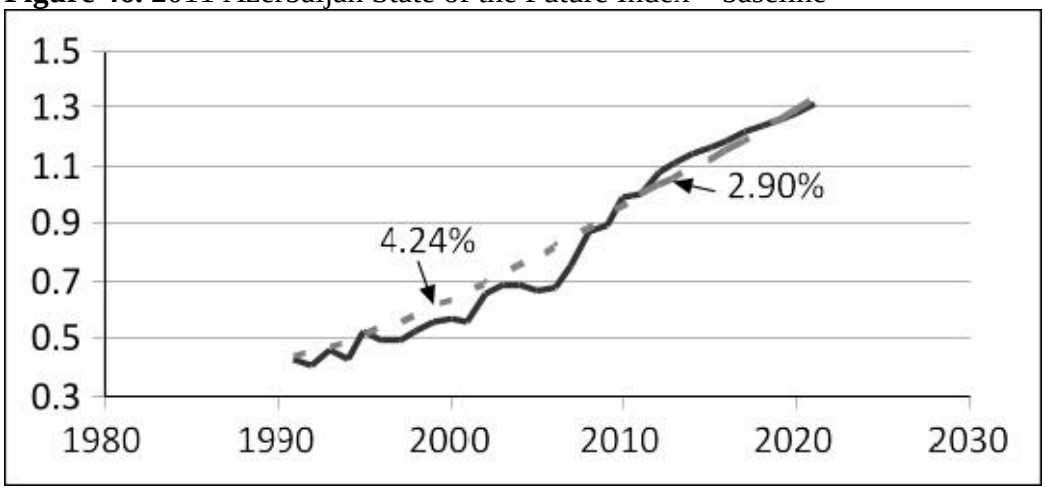
The variables chosen for the 2011 AZ-SOFI were:

1. Total GDP (mln manat)
2. GDP per capita (manat)
3. Fixed capital (mln manat)
4. Labor force (economically active) (thousands)
5. Bank assets (broad money) (mln manat)
6. TFP (GDP/FC/LF)
7. Non-oil GDP (percent of total GDP)
8. CO_2 emissions (thousand ton)
9. Capital investments for environmental protection and rational utilization of natural resources (mln manat)
10. Total protected area (percent of total land area)
11. GINI coefficient (a measure of inequality)
12. Population growth rate (percent)
13. Life expectancy (years)
14. Labor migration—foreign employees in country (persons)
15. Percentage of seats held by women in national parliament
16. Unemployment (percent)
17. Total energy production in oil equivalent (thousand tons)
18. Electric energy consumption per capita (thousand kwh)
19. Internet users per 100 population
20. Investment in ICT, total (mln manat)

These variables were chosen for their importance to the country's future and the availability of data for the past 20 years. The resulting AZ-SOFI graph (Figure 46) shows an accelerating improvement from 1991 to 2010 and continued progress for the following decade, but at a slower

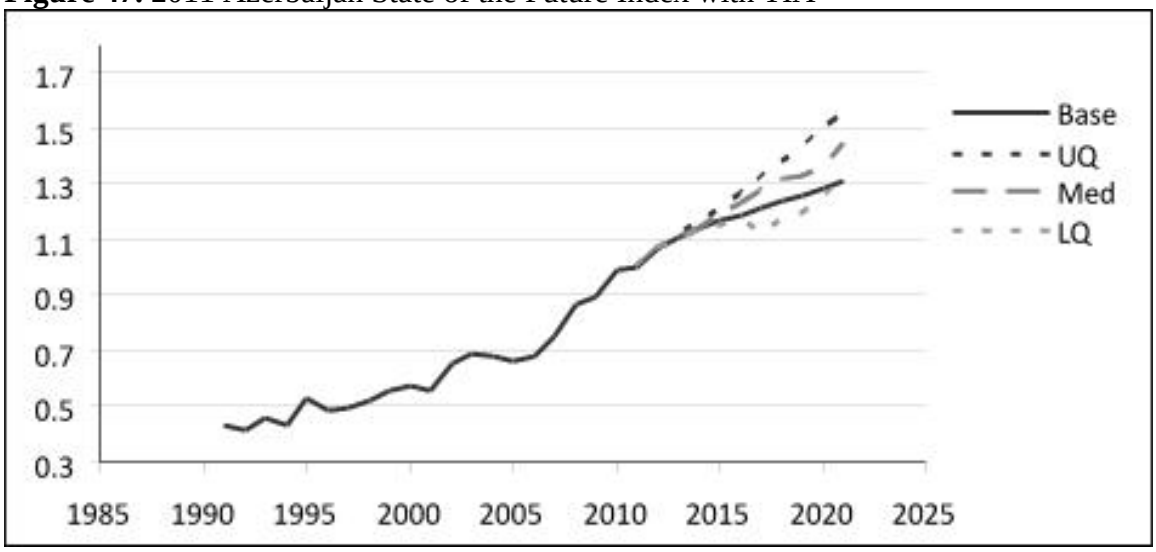
rate than the one recorded for the preceding three to five years.

Figure 46. 2011 Azerbaijan State of the Future Index—baseline



The 24 potential future developments that might affect the future of Azerbaijan were rated in terms of their probability of occurring, their impact on the future of Azerbaijan if they were to occur, and the institutional capacity to deal with the respective developments. The results were used for computing an AZ-SOFI applying a TIA, as showed in Figure 47. This generated various potential projections affecting the AZ-SOFI.

Figure 47. 2011 Azerbaijan State of the Future Index with TIA



A sensitivity analysis based on the outcomes provides important information to decisionmakers, identifying some structural and policy changes that might improve the future outlook of Azerbaijan and ensure that the country's long-term vision is not dependent on an oil-based economy.

The developments judged as having the highest potential impact on the future of Azerbaijan were:

- Water consumption problems are essentially solved.
- The non-oil component of Azerbaijan's GDP increases by at least 70% from that of 2011.
- The Nagorno-Karabakh conflict between Armenia and Azerbaijan is resolved peacefully.
- Broadband capacity in Azerbaijan improves 100% through the use of fiber optic cable.
- The share of production and services classified as innovative rises to 30% of all production and services.

The 10 developments rated to have the greatest combined potential impact and likelihood of occurring were:

- Broadband capacity in Azerbaijan improves 100% through the use of fiber optic cable.
- A new communications satellite scheduled for launch in 2013 leads to increased ICT revenues by at least 30%.
- Azerbaijan establishes policies designed to increase innovation and the technological component of fixed assets.
- Azerbaijan joins the WTO, which leads to significant developments in food security and activities of farm workers.
- Flooding of the Kura and other rivers is controlled.
- The number of people living below the poverty line remains at 12–15% or less.
- Rapid increase of urbanization results in overpopulation and environmental and social conflicts.
- Energy efficiency increases 1% per year for at least 10 years in a row in housing, household appliances, transport, and industry.
- Water consumption problems are essentially solved.
- At least 30% of all high school graduates enter universities.

Comparing the above lists with the ratings of institutional capacity of the respective developments helps identify the areas that are "ready" and those that might need structural changes and/or capacity building.

Computing the AZ-SOFI on an annual basis would provide valuable information on how priorities are changing or are being addressed, as well as a review and possible change of variables and potential future developments. Such inputs also help assess which actions would have the greatest impact on the overall future of the country.