

## CHAPTER 3. GLOBAL SCENARIOS

### 3.2 Exploratory Scenarios

Written in 1998 based on studies conducted in 1996–‘98

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## THE USE OF MODELS IN EXPLORATORY SCENARIOS

Through an informal exchange of email messages with selected global modelers, the Project conducted an informal inquiry about models and their potential uses in scenarios. We asked:

1. What models would you recommend we consider for this application? Barry Hughes of the University of Denver has made his International Futures model available to us. It is a superb global demographic/ economic model that includes assumptions about population, food, energy, and some aspects of political structure. Paul Raskin of Tellus has also made PoleStar available. This extensive and well-conceived model comes from Tellus and the Stockholm Environment Institute; the variables are generally associated with sustainability. The model was used by WRI's 2050 project. Bruce Murray recently ran a very interesting interactive scenario experiment- the Hyperforum - in which on-line comments and criticisms could be offered about scenarios that had quantification via PoleStar. So, question 1: what other models - if any - ought we to consider?

2. Specific scenarios and generalized models often don't match. If one starts by building a specific scenario and then trying to fill in the quantitative consequences using a model, it is unlikely that the scenario will contain the exogenous assumptions required by the model. Similarly, if one starts with a generalized global model, its output might not contain the information that makes for a focused and rich scenario. For example, suppose we are interested in constructing a scenario that explores the downstream effects of global information. It's easy enough to ad-lib a narrative that will be attractive and compelling but to reflect its consequences using an existing global model is tough. Most people would say if quantification of such a scenario is required, then build a specialized model. We're looking for an effective way to link specialized scenarios into more general global models. Any ideas?

3. Do you know of any global models that are based on adaptive agent modeling (e.g. SugarScape) or chaos/complexity principles?

A number of correspondents pointed out that the history of the use of global models in scenarios goes back to Larry Klein's Project Link and the Forrester-Meadows work for the Club of Rome. In the US President Carter's administration, Gerald Barney constructed a Global 2000 model. These models were of global scope and produced scenarios based on their projections. There were no global models or studies identified in which the scenarios came first and produced the assumptions required for the model.

Certainly, many models have focused on specific topics such as demographics, economics, energy, and the environment.

One respondent said, "As you've noted, we typically have scenarios on one hand and models on the other. I think part of the reason for this is the challenges that you've noted. But another reason is the different purposes to which these two approaches have traditionally been put - models for forecasting/"prediction" and scenarios for examination of alternatives and shifting of

decision-making paradigms.”

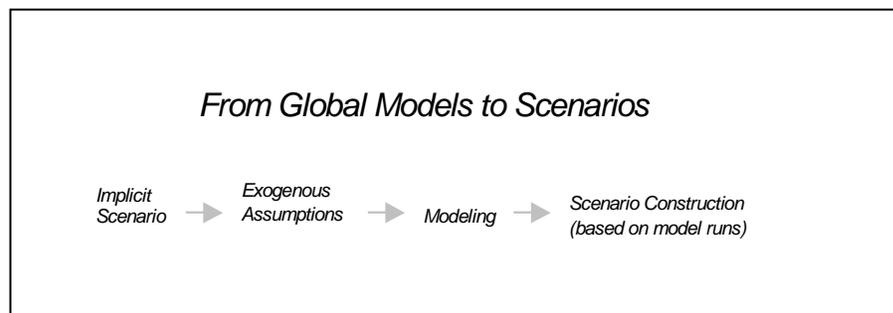
Another said, “Ultimately it may be better to build a specialized model that you understand and have control over.”

Several persons pointed out that high quantification does not necessarily equal accuracy. No matter what type of model is involved, simplicity is a virtue. The complexity of such models often obscures the real or underlying issues and confuses attempts to find effective policies. To reduce the obscurity of models and facilitate planning and policy analysis, some correspondents recommended the use of modeling approaches that depend on judgments - heuristic modeling - rather than historical statistics for their relationships. These types of models include: Trend Impact Analysis, Cross Impact Analysis, KSIM and a current version of its implementation EZ-IMPACT, STELLA (a form of systems dynamics), and Michael Godet’s MICMAC and MACTOR. Godet’s work in developing methods for scenario building continues; he recently published *Scenarios and Strategies, A Toolbox for Problem Solving* which provides an excellent guide to recent thinking on *la prospective*.

As one respondent put it, such models “work best with segmented problems, rather than the planetary system as whole. They are also done best by the experts and decision-makers themselves rather than by technical staff. They are not meant to be objectively valid representations of the world, only agreed upon representations of a group’s consensus on how the world works.....”

### HOW MODELS WERE USED IN THE EXPLORATORY SCENARIOS

Most model-based global studies start with the model and scenarios are derived based on the model’s output. When models are used in this way, assumptions must be made about “exogenous” variables- that is, the value of parameters that are used by the model but not computed by it, such as population growth rate or productivity. Choosing these exogenous variables always involves judgment on the part of the modeler, and are often based on an implicit scenario, as shown below:



Using global models to add quantitative rigor to exploratory scenarios carries some dangers. First, there is a risk that the model will over complicate the presentation. In some previous studies the model itself overshadowed substantive conclusions drawn from its use. Furthermore,

when complex models are used, it may be impossible to trace cause, effect, and the consequences of feedback. The results of a model run may be used to add numbers to a scenario but have little impact on scenario explanations that trace from the present to some future condition. Finally, numbers derived from a computer model often carry more weight than they should since decision-makers may believe that precision implies accuracy. For these reasons, the Millennium Project application uses the scenario to drive the model rather than visa versa.

In addition, one participant said:

“...in addition to the danger you point out, there is a wide tendency for politicians to prefer "subjective certainty" to objective uncertainty, probably reinforced by public and mass media pressures, or perceived pressures, to "be sure about what one is doing", as contrasted the true nature of critical choices as "fuzzy gambles with history".

I tend to the opinion that two main requirements for facing the difficulty, in addition to the imperative to have good, responsible and salient futures studies really relevant to what should be the concerns of senior politicians, are:

- a. To have in the advisory staff of high level politicians persons well familiar with futures studies and able to serve as "translator" between them and the politician in ways tailor-cut to fit his modes of thinking.
- b. To present futures studies outputs in the form of dynamic interactive computer programs adjusted to top decision makers, with special quality control to prevent ‘railroading’<sup>1</sup>.”

This respondent also said:

“...scenarios are no more or less than a format for presenting outlooks, with some question-posing features. Therefore, improving scenarios in meaningful ways may be impossible without improving outlook methods first.

And, concerning outlook methods, in my view what is needed is more explicit uncertainty sophistication and recognition of "inconceivability" and not more "exact", "quantitative" etc. methods which are ontologically unjustified, epistemologically without sound grounding and policy-wise misleading by creating illusions of quasi-certainty...”

### **UNUSUAL FEATURES OF THE EXPLORATORY SCENARIO PROCESS**

This study design took these warnings to heart. Uncertainty, to the degree possible, was made explicit. While the model added quantification, it was not used to produce an illusion of

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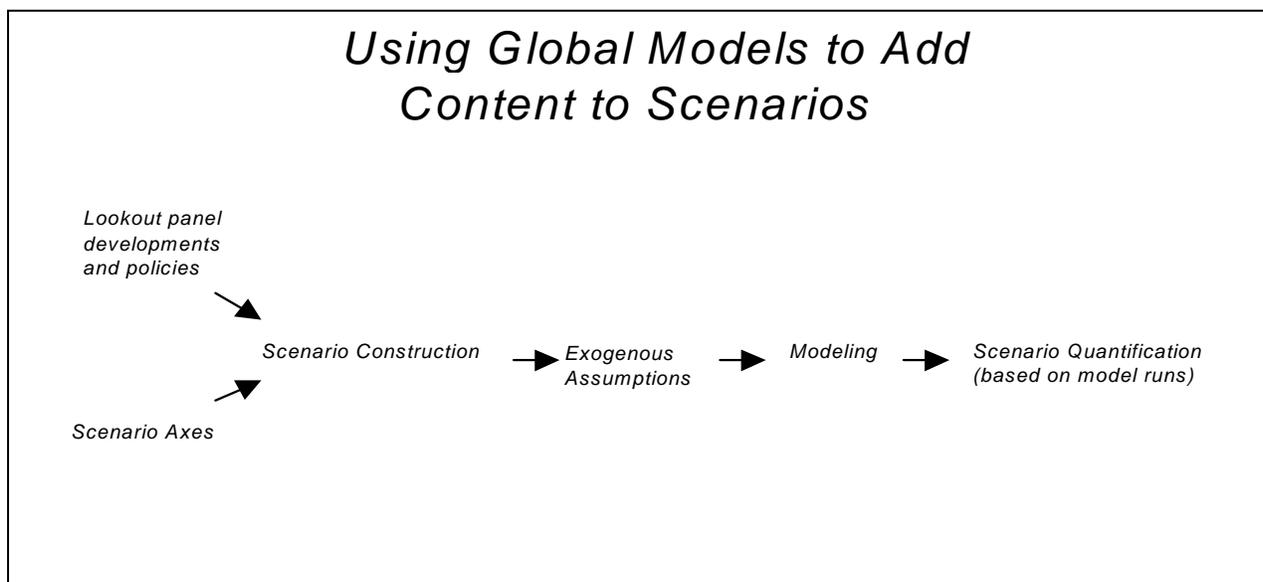
<sup>1</sup>The RAPID model, developed by The Futures Group. Typically the model is used to project population and its consequences in selected third world countries.

“accuracy.” but rather to help assure self-consistency. The Outlook methods were also novel and followed the 1996 Millennium Project approach: using the look out panels’ developments as an intrinsic part of the scenarios. The developments and policies found to be important by the lookout panels provided fodder for the scenarios; these developments and policies were incorporated in each of the projected worlds. And, finally, the method of incorporating the global model was novel. Rather than having the model drive the scenario, the scenario drove the model.

As usual, the drafting of exploratory scenarios began with the choice of the principal independent dimensions (axes) that seemed to force the worlds under examination to differ. Future “worlds” were formed around these choices using techniques described below.

In the next step, these explicit scenarios were used to provide the backdrop for the choice of the values of the exogenous variables in the selected model. Therefore, when the model was run, its output was consistent with the scenario on which the exogenous variables were based and the model provided quantitative estimates of the value of variables that were then incorporated within the scenario.

Outline of the process:



This process was viewed as experimental. While global models may add quantification to scenarios, they may not be able to capture the nuances of a scenario; purpose-built models may ultimately prove to be more appropriate. Furthermore, the appropriate level of quantification was uncertain at the outset.

While several different global models were considered, International Futures was selected. It was well documented, relatively easy to use, and made freely available to the Project.

To use the model, a matrix was created. The columns consisted of "handles" or exogenous parameters in IFs’ model; and specific scenario features, the rows. The staff could enter judgments into the cells depicting the effect of the scenario features on the IFs variables. To

illustrate, suppose a scenario described a blossoming information society. Among the downstream effects of global information flows for which handles already exist in the IFs model would be

1. boosts to the technological (or total factor productivity) contributions to total GNP measured economic growth,
2. boosts to specific kinds of production, such as agricultural yield, or, through changes in cost structures, renewable energy production,
3. changes in certain social variables, such as use of contraception, and
4. possible changes in the propensity for trade.

Nevertheless there are many anticipated effects that IFs could not handle, either for lack of parameters/handles or, more seriously, because of the model structure.

### **THE CHOICE OF SCENARIO AXES**

A second informal inquiry was conducted via e-mail and the Project's home page to collect opinions about the principal drivers that should be used to construct the MP scenarios. The questionnaire contained the following question:

You are invited to participate in selecting scenario dimensions or axes for the development of Millennium Project global scenarios...and to submit your suggestions.....about the principal "dimensions" or "axes" that the project staff should use in building global exploratory scenarios.

The construction of a set of exploratory scenarios generally begins with a choice of the "dimensions" or "axes" that distinguish one scenario from another in the set of scenarios. For example in 1996, the Millennium Project scenarios used these dimensions:

1. Degree of harmonization; that is, degree of standardization across the world.
2. Economic vitality; that is, overall GNP measured global economic activity.
3. Social focus; that is, the predominant social ethos from individualism to community.

These three dimensions worked well enough and from the possible permutations of the extremes of these axes, three cases were chosen to form sketches and illustrate the method of scenario construction. They are included in the project's book: "*1997 State of the Future: Implications for Actions Today.*"

Now the Project is about to apply a great deal of additional effort into the construction of detailed global exploratory scenarios. Since the 1996 scenarios were to be no more or less than illustrative, it seems appropriate to ask about the dimensions that will identify and separate the next set of Millennium Project scenarios.

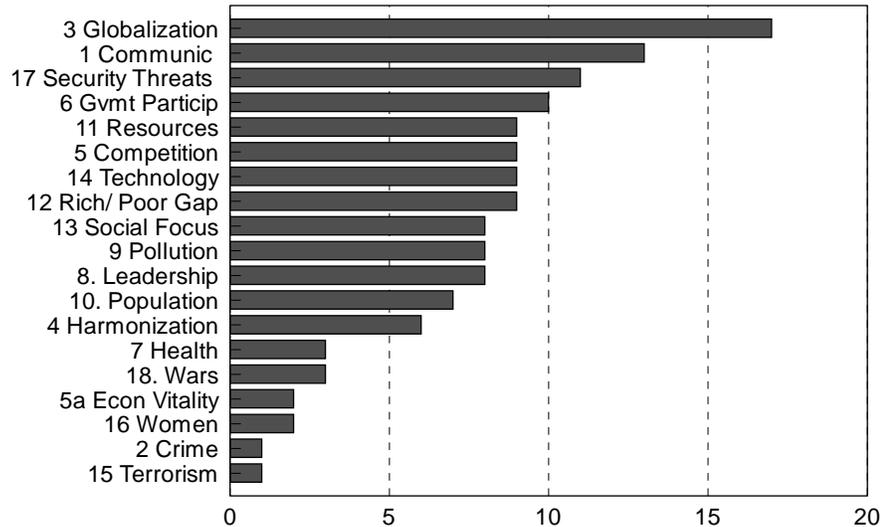
Please select four (4) possible dimensions from the list below for the project to use to define global scenarios. You are welcome to suggest others. Remember, it's not whether you think these are important - they all are. Each will be addressed in one way or another in the scenarios. You are being asked a different question: What should drive our scenarios; that is, from what sources should the scenarios flow out to the year 2025.

1. Communications technology (from vibrant to stagnant)
2. Crime (from massive concern to contained)
3. Degree of globalization (from free trade to isolationism)
4. Degree of harmonization; (from shared standards to ad hoc)
5. Economic competitiveness among nations and companies (high to low)
- 5a. Economic vitality, overall global economic activity (from high to low)
6. Government participation in society (from high involvement to little or laissez-faire)
7. Individual health (from greatly improved to deteriorating)
8. Leadership (from inspired and effective to dismal and ineffective)
9. Pollution (from disastrous to being cured)
10. Population growth (from high to low)
11. Resource availability (from abundance to scarcity) to year 2025
12. Rich/poor gap-within and among countries (from widening to narrowing)
13. Social focus (from individualism to community)
14. Technology (from vibrant to stagnant)
15. Terrorism (from major concern to benign)
16. The status of women (from improving to stagnating)
17. Threats to global security and/or quality of life (high to low)
18. Wars (from volcanic to quiescent)

Respondents were also invited to suggest their own axes for consideration.

In all some 35 responses were received; the figure “Driving Dimensions” shows the distribution of responses.

## Driving Dimensions



- Rate of Change; that is the ability to deal with change (manageable change to unmanageable change)
- World Core (educational) Curriculum (from stagnant towards fully endorsed)
- Intellectual Focus: from virtual worlds (multimedia/religion/ideology) to real worlds (construction/natural sciences)
- Discontinuity in the Existing Paradigm (from centralized urban commerce to decentralized rural agrarian)
- Gap in Consciousness Growing Between the Wisdom rich and the Wisdom Poor
- Diversity as an exploratory "n" dimensional issue, cultural, economic, biological
- Quality of life index
- Effectiveness and Stability of Governance Systems
- Social focus, Social cohesion
  - 1) Degree of synthesization of information
  - 2) Level of global stable economic activity
  - 3) Overpopulation (or level of migration to cities or standard of living in rural areas)
  - 4) Number of stable alliances incorporating countries from different cultures
- A synthesis of 6 and 17; scale from legitimacy to power struggle
- Degree of government investment in technologies
- Degree of government control of Internet and other media
- Nationalism
- International cooperation in communications networks.
- Role of religion

- Stabilization of Ecological Load, where Ecological Load is defined (after Ehrlich) as overall population times per capita consumption times an appropriate index (can be estimated) of technological impacts on ecology associated with consumption.
- Societal Dynamic that is the effective leadership (or domination) of individuals or groups in a global telecommunications village of the 21st century.
- How individuals cope with their surroundings
- Economic/Ecological compatibility; including the UN HDI rating and World Bank Wealth Index
- The growing impact of the principles of non-violent conflict resolution.
- Development of biotechnology (genetic engineering, cloning) stirring questions which affect the very sense of human existence and of already existing value systems.

All of these suggestions were considered in the actual construction of the scenarios.

The axes at the top of the list, globalization, leadership, communications, and government participation in society were taken as the driving forces. Permutation of the extremes of these axes were used to form the possible 16 scenarios:

**The Permutations of the Axes***3 Globaliz 6 Govmt Invo 1 Commun 17 Security*

		<i>Trade</i>	<i>Isol</i>	<i>High</i>	<i>Little</i>	<i>Vibr</i>	<i>Stag</i>	<i>High</i>	<i>Low</i>	
1	Win Win	x		x		x		x		Revamping financial system
2	Seamless Nations	x		x		x			x	Global social contract
3	Big Brother	x		x			x	x		Technology backlash
4	Control and Worse	x		x			x		x	Govmt controls Internet; TV; Luddism prevails.
5	Cybertopia	x			x	x		x		The age of communications
6	Rich Get Richer	x			x	x			x	Competition gets out of hand
7	Trading Places	x			x		x	x		Developing countries flourish
8	Systems Breakdown	x			x		x		x	Law and enforcement on the rocks
9	Communitarianism		x	x		x		x		Power goes to local groups
10	High Tech Wars		x	x		x			x	Technology = power
11	Passive Mean World		x	x			x	x		Growth slows; sustainability suffers.
12	Inertia Wins		x	x			x		x	Government is ineffective
13	Nirvana Now		x		x	x		x		Prayer via Internet; religious revival
14	The Aftermath		x		x	x			x	Computer crime = collapse
15	Who Cares?		x		x		x	x		Things go to hell; who cares?
16	Aggressive Mean World		x		x		x		x	Bad leadership, corruption, poverty

Now the question: which of these are most interesting for further development? All have their points, but in the end, the team selected four scenarios on the following bases:

- ◆ continuity with the Project's 1996 scenario work
- ◆ match or contrast to the parallel normative scenario work
- ◆ scope of issues and policies likely to be involved
- ◆ severity and permanence of the issues raised
- ◆ contrast among the scenarios in the set

The selected scenarios were:

5. ***Cybertopia***: Computers and communications make a better world
6. ***Rich Get Richer***: Active intense competition gets out of hand
7. ***Trading Places***: The developing countries flourish; the rich stagnate
11. ***Passive Mean World***: Things go to hell; try to fix the problems but can't; environmental priorities suffer.

Two scenarios were candidates for normative development:

1. ***Win-Win***: a revamping of the world's financial system
2. ***Seamless Nations***: a civil society that balances business with a new social contract

## **BUILDING THE EXPLORATORY SCENARIOS**

In constructing the Millennium Project's exploratory scenarios, five checklists or preliminary sources of information were used:

- A characteristics matrix, which provided the essential outline of the scenarios' content
- An issues checklist derived from the 1996 MP Lookout panel.
- An opportunities checklist derived from the 1997 MP Lookout panel.
- A set of exogenous variables used to set up the International Futures model that provided the quantitative underpinning of the scenarios.
- A set of "lessons of history" derived from an Delphi inquiry of historians. (*This has not yet been used in the enclosed scenario examples.*)

A characteristics matrix was constructed for the four exploratory scenarios. The purpose of this matrix is to guide the team in its preparation of the first narrative drafts; it is designed to elicit questions in selected domains for each case under study.

**The characteristics matrix**

	Case 2	Case 6	Case 7	Case 11
<b>Domain</b>	<b><i>Cybertopia</i></b>	<b><i>Rich Get Richer</i></b>	<b><i>Trading Places</i></b>	<b><i>Passive Mean</i></b>
<i>Demographics, Human Resources</i>				
Population	as projected	as projected	as projected	as projected
Migration	low	higher than usual	low	high
Health	good	good for rich	improving	who can afford
Food and Water	good	abundant for the rich	good	deteriorating
Education	on line	abundant for the rich	new third world centers	only the dedicated
Leisure	intl. on line games	intl. on line games	spreading	time hangs heavy
<i>Environment and Biodiversity</i>				
Pollution	track on line	improving in rich countries	downhill then better	downhill
Biodiversity	inventory on line	where it can be afforded	where it can be afforded	downhill
<i>Technology</i>				
Information, Communications	sizzling	hot spots	being repaired	languishing
Biomedicine and Psychiatry	computer assisted	hospitals as spas	lots of stress	stress stress
Search for Knowledge	all you need on line	where are the markets?	what is truth?	where are the jobs?
Machines	electronics	capital intensive	labor intensive	R&D lags
<i>Governance and Conflict</i>				
War and Political Stability	world standards stabilize	tensions high	shaky	lots of tension; a few wars
Terrorism and Crime	viruses everywhere	white collar	who trusts the system?	petty crime abounds
Governance	automated town meetings	right	root out corruption	demagoguery abounds
<i>International Economics, Wealth</i>				
Rich Poor and Other Gaps	diminishing	growing	diminishing	only rich are making it
Organizations	global on line	old boys	wary relationships	coming apart
Work	cybernuts	vertical, structured	reduced brain drain	where is work
World Trade	linked on the net	market partners	spreading trade	flight to quality, liquidity
<i>Integration and Whole Futures</i>				
Planning	models	sure	leapfrog is in	if only we could
The Pursuit of Meaning	through VR	trough wealth	what risks are OK?	only in books
Social Change	isolation via electronics	the gap grows	the gap narrows	siege mentality

The 1996 Lookout panel produced some 180 developments that were thought to have important global consequences. The list of the developments was sorted by the average judgment of importance. Each item on the top of the list was elaborated in each scenario, thus merging the judgment collecting technique with the scenarios. The following issues were the top-set.

Explanation of the following tables:

- *rank*: how the development was rated (ex. 1 means the most important)
- *first number (ex.24)* = development's number in the questionnaire
- *numbers at the end (ex. 1.42 1.44)* = item represent the panel's judgment about likelihood and importance, 1 representing the most likely and important and 5 the least likely and least important
- *numbers in brackets (ex: 95,159)* = the questionnaire-number of the developments related to this one

1	24. High population growth among poor nations and people. 1.42 1.44
2	40. Increased scarcity of fresh water, possibly exacerbated by global warming. 1.68 1.47
3	129. Threat of regional nuclear conflict when more and more countries and potentially terrorist groups will have access to nuclear weapons. 2.30 1.51
4	74. The widening economic gap between the 'haves' and 'have nots' within and between countries. 1.58 1.54
5	39. Increased food scarcity owing to population growth and a general inability to increase production to keep up with that growth 1.97 1.57
6	55. Globalization: increasingly clear demand for global thinking, responsibility, ethics, approach, effort, action and results. 1.88 1.58
7	127. Destruction of the environment, especially loss of biodiversity. 1.96 1.64
8	113. Increasing resistance to antibiotics. 1.57 1.68
9	3, 37,134. Nuclear terrorism and proliferation posing far more of a threat to the survival of the human species than is generally appreciated. 2.49 1.68
10	27. Doubling of the demand for energy in less than 30 years as a result of population and economic growth 2.10 1.69
11	30, 135. Industrialization of China, India, etc., increasing the load on the environment by a factor of five to ten. 2.14 1.71
12	126. The uneven and unfair distribution of wealth among nations (North South divide) and also within nations. 1.54 1.74
13	117. Changing role of women in society. 1.57 1.78
14	108. Presence of HIV in 25% of the adult population of essentially all cities in sub-Sahara Africa. 1.91 1.82
15	23 33 Religious racial and ethnic wars such as Rwanda and Liberia. 1.54 1.82
16	70. Organized crime groups becoming sophisticated global enterprises with the know how to yield enormous illegal profits (information fraud, organ traffic, arms traffic, etc.). 1.72 1.83
17	8. Increasing number of micro-organisms that are immune to pharmaceuticals or pesticides. 1.71 1.84
18	57. Improving economic status of many "developing" countries, thus increasing global demand for food, energy and manufactured products. 1.74 1.86
19	67. Increasing failure of governments in 1st world countries due to inability to manage complex systems - widening gap between rate of technological change and societal/institutional change. 2.02 1.87
20	9. Increasingly apparent conflicts between economic and societal aims: economic measurement and incentives subvert social growth 2.04 1.91
21	48. Increased frequency of re-emerging and new diseases. 1.92 1.92
22	12. Increasing complexity of issues that lead to conflict, outstripping ability of institutions to anticipate and deal with the issues. 2.27 1.93
23	75. Natural resources being bought up by international cartels, with unprecedented speed and scale, in a decade, 70% of the natural resources in the world will be controlled by private financial powers. 2.25 1.93
24	14. A false sense of security about the extent of natural resources. 2.33 1.93
25	130. The increasing deterioration of the international monetary system based mainly on US dollars. 2.48 1.94

The study team integrated these developments by asking questions of this sort: If the world really turned out to be as described in the scenario, what then would be the consequences of developments in the list above; for example: “High population growth among poor nations and people” and “Increased scarcity of fresh water, possibly exacerbated by global warming?”

Similarly, the 1997 Lookout panel identified some 150 promising developments and these were also rated by importance and likelihood. This set of positive, important and likely developments is listed in the following table.

1	111. Convergence of information/ communication technologies (including Internet) and social technologies for improved education, employment, environment, health, and production not only at a national level but in communities. (8, 15, 49, 54, 60, 63, 64, 83, 98, 99, 105, 128)
2	101. Vaccinology; new vaccines for current non-immunizable diseases and for a wider spectrum of ages are
3	75. Diffusion of biotechnology around the world.
4	43. Alternative progress indicators such as the Human Development Index (HDI) and Genuine Progress Indicator (GPI) that reflect qualitative factors such as social and environmental issues.
5	107. Development of the EU; extension to the East, reduction of possibility of European wars. (127).
6	118. Diminishing population growth rate in most countries of the world, due to improved literacy, empowerment of women, diminished infant mortality, improved and inexpensive contraceptives, and effective
7	46. Very cheap and effective anti-malaria medications (Artemisinin and their derived products).
8	19. Micro-entrepreneurship, e.g. Grameen Bank plan; \$1.5 billion in loans have been extended for self-employment purposes to some of the world's poorest people in some 35,000 villages.
9	34. The reconciliation movement in South Africa.
10	23. Development of affordable cars that produce 1/3 the amount of CO <sub>2</sub> , are otherwise pollution free and do not require petroleum.
11	1. Acceleration of trend toward democracy due to globalization of markets, media and telecom/infotech. (88)
12	69. Rapid development of the field of ecological engineering and an industry for environmental protection.
13	40. Movement toward sustainable development; restructuring of economies: decrease of polluting industries and production processing, increasing services; improving efficiency with less workforce. (95, 159)
14	42. The use of solar energy, wind or other alternate sources to replace fossil energy sources (155, 161)
15	82. Carrying out of ecological and medical scanning in order to identify the influence of the quality of the environment on the health of the population.
16	73. More active processes of development of common programs in different regions of the world.
17	65. Ecologization of economy and consciousness.
18	108. Transitions from dictatorships to democracies; particularly the African, Latin American and Eastern European/ Russian dictatorships.(131, 141)
19	106. Ecologically based agriculture; science-technology and information replace large consumption and waste of energy and material in agriculture.
20	52. UN reform and first steps to global governance (not government).
21	149. Environmental security becoming an important national security issue.
22	129. Development of techniques for non-violent conflict resolution. (132, 156)
23	74. Advances in biotechnology leading to improved food availability and the liquidation of hunger in the world, as well as enhanced health, improved animals, insect-and disease resistant plants, etc. (84, 104)
24	57. Development of new theoretical principles in science leading to great improvements in energy, motive engines, information systems, geophysical devices, material processing, medical devices, etc.

The fourth preliminary checklist was comprised of exogenous variables for the IFs model. In

correspondence with the model's designer, Dr. Barry Hughes of the University of Denver, a set of input variables was identified as being scenario dependent, and values were assigned to these for each scenario. In some cases, the values were given elements of the scenarios; in others, they were judgmental and selected to be consistent with the intended spirit of the scenarios. The set is shown below. When the variables can differ geographically, the numbers in each cell represent the value of the parameter for US, EU, Japan, Latin America, Africa and China. CWARBASE is a special case; their base probabilities are shown for selected warring parties.

In the model, these base values hold for all years in the future. In our scenarios runs, the values can change with time and the values shown in the cells represent 1997 and 2025 assumptions.

	Base Value	Case 5	Case 6	Case 7	Case 11
<b>Domain</b>		<b>Cybertopia</b>	<b>Rich Get Richer</b>	<b>Trading Places</b>	<b>Passive Mean World</b>
<b>Demographics, Human</b>					
TFRM: Total fertility rate multiplier	US: 1 EU: 1 Japan: 1 Latin Am:1 Africa: 1 China: 1	.99 .99 .99 .98 .96 .99	.99 .99 .99 .98 .96 .99	.99 .99 .99 .98 .96 .99	1.01 1.01 1.01 1.01 1.03 1.02
MORTM: Mortality multiplier (controls life expectancy)	US: 1 EU: 1 Japan: 1 Latin Am: 1 Africa: 1 China: 1	.98 .98 .98 .93 .80-.45 .96	.98 .98 .98 .91 .75-.35 .85	1.01 1.01 1.01 1.0 1.01 .99	1.01 1.01 1.01 1.01 1.01-1.03 1.02
<b>Technology</b>					
TLEADERR: Technology growth rate of system leader	.01 single value	.01	.01	.01	0
TECHADD: Technology growth rate relative to system leader	US: 0 EU: 0 Japan: 0 Latin Am:0 Africa: 0 China: 0	-.002 -.002 -.005 -.0025 0 .05--.01	-.002 -.002 -.005 -.0035 0 .05--.01	-.01 -.01 -.01 0 0 .05-0	0 0 -.008 -.003 0 -.006
YLM: Yield multiplier	US: 1 EU: 1 Japan: 1 Latin Am: 1 Africa: 1 China: 1	1.1 1.1 1.1 1.2 1.25 1.25	1.1 1.1 1.1 1.0 .98 .9	1.1 1.1 1.1 1.2 1.25 1.25	.98 .98 .98 .98 .98-.9 .9
LOSSM: Multiplier on food production lost	US: 1 EU: 1 Japan: 1 Latin Am:1 Africa: 1 China: 1	.98 .98 .98 .97 .95 .98	.98 .98 .98 .97 .95 .98	.98 .98 .98 .97 .95 .99	1.03 1.03 1.03 1.03 1.03-1.05 1.03

ENDEMM: Energy demand multiplier	US: 1	1	1	1	.97
	EU: 1	1	1	1	.97
	Japan: 1	1	1	1	.97
	Latin Am: 1	1	1	1	.97
	Africa: 1	1	1	1	.97
	China: 1	1	1	1	.97
ENPM: Energy production multiplier, oil	US: 1	1	1	1	1
	EU: 1	1	1	1	1
	Japan: 1	1	1	1	1
	Latin Am: 1	1	1	1	1
	Africa: 1	1	1	1	1
	China: 1	1	1	1	1
QEM: Capital cost of energy multiplier (increasing values mean a increase in capital/energy)	US: 1	.98	.98	.98	1.05
	EU: 1	.98	.98	.98	1.05
	Japan: 1	.98	.98	.98	1.05
	Latin Am: 1	.98	.98	.98	1.05
	Africa: 1	.98	.98	.98	1.05
	China: 1	.98	.98	.98	1.05
RESORM: Resource availability multiplier	US: 1	1.03	1.03	1	.95
	EU: 1	1.03	1.03	1	.95
	Japan: 1	1.03	1.03	1	.95
	Latin Am: 1	1.03	1	1	.95
	Africa: 1	1.03	1	1	.95
	China: 1	1.03	1	1.05	.95
<b><i>Governance and Conflict</i></b>					
CWARBASE: Conventional warfare base probability (US/China, Japan/China, Africa/Africa, Russia/ EU)	US/China: 0				20
	Japan/Ch: 0	10	10	10	30
	Africa/Af: 0	15	30	15	50
	Russia/EU: 0	40	50	40	20
		10	20	10	
<b><i>International Economics, Wealth</i></b>					
INVM: Investment multiplier (controls investment)	US: 1	1.1	1.1	1	.95
	EU: 1	1.1	1.1	1	.95
	Japan: 1	1.1	1.1	1	.95
	Latin Am: 1	1.1	.95	1.1	.95
	Africa: 1	1.1	.90	1	.95
	China: 1	1.1	.95	1.1	.95
PROTECM: Trade protection/openness multiplier (works like tariffs)	US: 1	.95	1.2	1	1.2
	EU: 1	.95	1.2	1	1.2
	Japan: 1	.95	1.2	1	1.2
	Latin Am: 1	.95	.95	1	1.2
	Africa: 1	.95	.95	1	1.2
	China: 1	.95	.95	1	1.2

## THE EXPLORATORY SCENARIOS

The scenarios, with the lookout panel developments and model output included, were sent to a select group composed of experienced scenario writers and political experts for comment and revision. The scenarios follow.

The following codes are used:

All graphs come from the IFs (International Futures) model;

- (IFs) indicates numerical estimates that were derived from the IFs model;
- # # -A indicates a 1996 lookout panel development
- # # -B indicates a 1997 lookout panel development
- # # -LOH indicates an entry derived from Lessons of History

Example: (117-A) means that this paragraph is based on the development 117 identified by the 1996 Lookout panel.

### ***Case 5. Cybertopia***

Globalization: Trade    Govmt Involvement: Low    Communications: Vibrant    Security High

The explosive growth of Internet accelerated globalization in all forms. Cyberspace became the medium of human activity, as the city had for the industrial transition. The majority of human waking hours were spent in cyberspace.

In the early days, men were users of cyberspace much more frequently than women. Learned dissertations were written on the matter- why should this be so? But the “digital ceiling” gradually came down and while parity does not yet fully exist, there is no gender barrier in cyberspace. In fact most transactions are conducted without any reference to gender.(117-A)

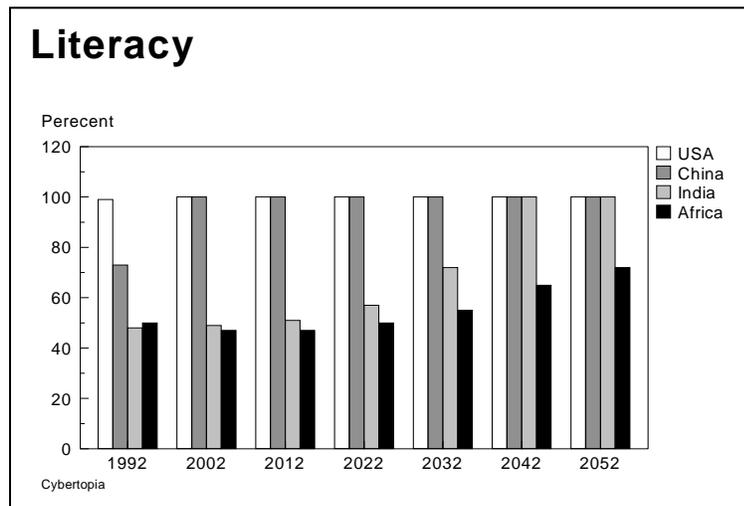
The "Year 2000 problem" was a temporary roadblock for all countries that had older mainframes and software - primarily the OECD countries; solving the problem proved to be an opportunity for modernization and growth. Falling prices and increasing capacity and ease of use of microminiaturized computers connected almost everyone to anyone, anywhere, for nearly anything that could be digitalized. People became accustomed to interacting around the world every day for work, play, leisure, and education. There was a convergence of information and communication technologies (including Internet) with social technologies that resulted in improved education, employment, environment, health, and production not only at a national level but in communities (111-B). There were global 800 numbers and corporate global networks; these networks were not just for settlement but were the meeting place of choice where auctions were held, and bids were placed for manufacturing and service work. These industry networks were closed and essentially defined an industry. If your company was in the net you were part of the industry, if not your company was a renegade. Decision-making speed was key to success in this world; organizations burdened by bureaucratic overhead were left behind.

This explosive growth in international activity translated into increased support for and responsibilities of the UN family of organizations such as the WTO, IMF, ITU, and others that provide global standards and cooperation for international business. Some of these enterprises were governmental, others are private. All sought new members; all viewed themselves as global facilitators.

With easy access to world education and markets, individuals acted like holding companies investing their time in diverse activities, inventing their careers, granting access to others as nations used to grant visas. Individuals easily switch loyalty from one company to another. Most people had a sense of what they wanted to do and what they had to do to achieve it. Individuals

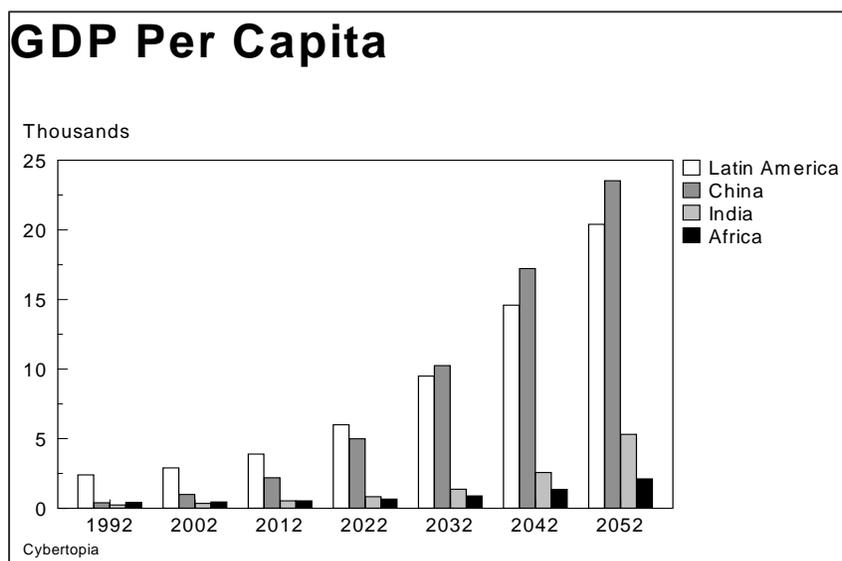
set their own values and used global networks to support those values. Democracy flourished. (1-B)

UN systems and multi-national corporations formed many partnerships such as INSPACECO to manage orbital space activities, INEDSAT to manage global education, and INMEDSAT to manage tele-medicine. Global TV systems provided public access TV channels for exchanging information and local solutions. Mission to Planet Earth succeeded in environmental monitoring necessary for UNEP's coordination of environmental management. (82-B). Coordination via cyberspace promoted the development of common programs in different regions of the world. (73-B)



Developing countries made remarkable progress via tele-education, telemedicine, telebusiness partners, and telecitizens in richer areas who assisted their poorer homelands. It was the Internet that brought advanced medical information, promoted family planning, and enhanced literacy through international lectures of top educators around the world. Technology, including biotechnology, spread globally (75-B); this promoted “leap-frog” development in poor countries that

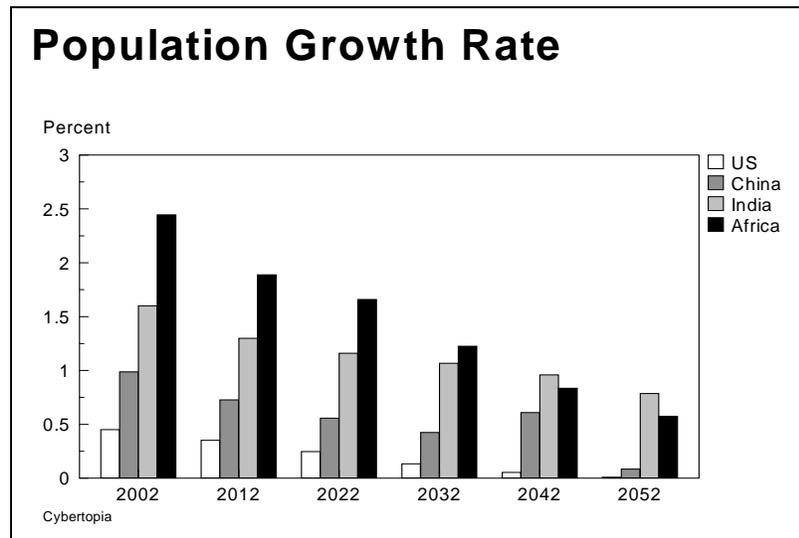
could now develop and follow new paths to wealth. In Africa, life expectancy rose, not an unmixed blessing since this helped increase the level of population, but with falling birth rates, literacy improved, and economic conditions were much less dismal than they might have been.



Significant differences still existed between the developed and the developing countries, but they were narrower than before (for example, comparing data for 1995 and 2050, the ratio of GDP per capita between the US and Latin America dropped by half; the reductions were even more striking for poorer countries). African GDP/capita quadrupled, from about 500 dollars per person to over 2,000 dollars

per person. However many countries were advocating abandonment of the old measure of GDP and accepting alternative progress indicators such as the Human Development Index (HDI) and World Bank's Wealth Index that reflect qualitative factors such as social and environmental issues. (43-B).

With the spread of information, population growth rate slowed. In the old days, there was a high correlation between population growth rate and GDP per capita; nowadays there seemed to be a



correlation between population growth rate and the intensity of use of cyberspace. Economists and demographers pointed out that use of cyberspace generally correlated with income and therefore the relationship with population growth rate may be spurious; however the direction is clear. Cynics said: "if you're in cyberspace you can't be making babies." (24-A) But most people felt that population growth rate had dropped in most countries of the world, because of improved literacy, empowerment of women,

diminished infant mortality, improved and inexpensive male and female contraceptives, and effective family planning programs. (118-B)

Unfortunately, unemployment - particularly in the cities of poorer countries - was still a problem. Although INEDSAT and global public access TV made universal education possible, not all countries were able to incorporate or make use of cyberspace in their economies. The knowledge economy left some people behind; most of these people were poor. Entitlements seemed to be an archaic concept and the safety nets, such as they are, were thin almost everywhere. Global social welfare standards via WTO became necessary to prevent migrations of the poor and mega-corporation social marketing kept social order.

In both China and India, writing of software for games and more serious pursuits became a major source of employment. It came as no surprise, therefore, that people in these countries were large users of cyberspace. Industrialization in both countries benefited from the savings of these high-end service sectors' employees. By 2050, in both India and China, the value added by services exceeded 50% of the GDP. (IFs) To a degree, the need for external capital was diminished by this source and, therefore, industrialization could proceed with less need for external borrowing. The environmental impact of this industrialization was a bit less than it might have been since the cyberspace linkages provided the countries with access to technology and information about modern practices. (30, 135-A)

The question was not whether there was uneven distribution of wealth between rich and poor

countries or between rich and poor within a country, but whether the widespread use of cyberspace intensified or diminished this disparity. In 1996, the UNDP reported that the wealth of the top 384 billionaires on the one hand equaled the wealth of the lowest 2.3 billion people in the world on the other. Those who argued that cyberspace would diminish the disparity, pointed out the new opportunities for collaboration, education, and self-employment that the net provided. The who argued against said that the advantages of the new medium were unequally distributed and that a new class of billionaires was being made so that this ostensibly democratizing technology just gave advantage to another set of people. (126-A)

Like-minded people sought each other and met on the Internet; the geographic barriers dissipated. Thus while cyberspace made some activities that had been local, global, it made others that had been diffuse, concentrated. People that held similar views on a political issue joined together on the net. While sociologists still don't agree, many felt that this centripetal component helped focus one-dimensional issues and what had been a molehill in a remote community suddenly attracted global support. Racial and ethnic identity was the glue of many of these special interest groups. Where there was a geographic focus, others from the safety of remote locations could blow on the flames of simmering animosities. Thus the Internet, apparently neutral politically, by linking like-minded people, fostered dissent. (23, 33-A)

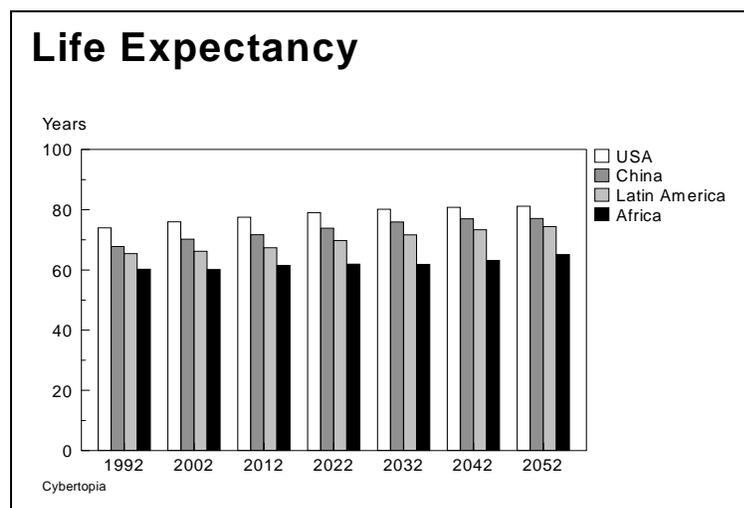
The development of cyberspace created what some people came to call a global brain: the interconnected minds of people commonly related in their interests or concerns. If it was a brain it was schizophrenic: the groups connected on any single topic rarely came to consensus, the ranges of opinion were wide and the opinions vociferously held. The ability to converge in open forums was elusive. Some historians of the net call this the age of automated anarchy. Parliaments everywhere used opinion polls and the net to collect opinions to guide their votes. But the sample was highly skewed and in the end the din and cacophony almost overwhelmed clear thinking and political responsibility. But some few networks produced results. These nets connected scholars, politicians and thinkers, not to produce consensus, but rather to explore options. Because they could be global, they could go beyond jingoism and self-interest. However, because their membership was invited they were accused of elitism. Nevertheless, a few were responsible and made a difference in diplomacy and problem-solving. (55-A) One unexpected result was the rise and contribution of the amateur; for example by linking amateur astronomers on the Internet, sky surveys for star occultation and sweeps for comets now had a global reach. SETI- the search for extra-terrestrial intelligence- was also a global enterprise of amateurs, each searching an assigned narrow portion of the spectrum for coherent signals from space.

The conventional monetary system was replaced in most countries by a new form of international currency- electronic credits. The precursor was the transition of direct mail from postal catalogs to "buy on the net." This transition required that a new form of electronic currency be developed, and it was. Just as the gold standard disappeared, so did currency; the triggering development was the introduction of an encrypted accounting system that proved very hard to penetrate, although some cynics said that governments still could do it if they wished. Hacking into the system became a capital crime. There is great suspicion that governments in their secret meetings manipulated the records so as to control global inflation- that may be but the system seems to work. (130-A)

Improved record keeping and international databases helped mitigate potential food crises in three ways. First, FAO's ability to predict local famines was greatly improved. The warning time moved from a matter of days to weeks, enough time to begin to modify the cumbersome distribution system that made food more available to those who otherwise would soon be hungry. Second, international genome data bases containing the sequences of high yield and insect-resistant strains provided laboratories everywhere with information on which research programs could be based to produce indigenous crops with desired characteristics. Despite these improvements, the problem of local starvation was not solved however, because the people who were hungry were poor and the high yielding strains tended to be expensive because of patents that protected them. Nevertheless attention could be drawn to trouble spots much earlier than before. (39-A). Finally, international scanning of ecological and medical data added greatly to knowledge about the environment and its health effects. (82-B)

By 2000, one of the major concerns of futurists and environmentalists was the depletion of fresh water. The growth of international record keeping led to the formation of fresh water databases that showed in more detail than ever before, where the water was, who was using it, and most importantly, inefficiencies in use. The databases formed the basis for international agreements and some time was gained. Nevertheless the clock kept ticking and the inevitability of population and economic growth continued to place great pressures on fresh water supplies. For richer countries, desalination and other techniques are possible, as supplies become scarce; however, it is still an issue that remains unsolved for poorer countries. (40-A)

The international networks were extremely valuable to both environmental monitoring and environmental management. Not only could UNEP coordinate quickly and globally, but whole new categories of records were established; one of the most significant was a catalog of bacteria. Some economists used these data bases as a means for establishing systems of taxation and credits based on the uses of the commons. Nevertheless, while easy global communications fostered the movement toward sustainable development (40-B), the environment and biodiversity still hung in the balance.(127-A)



People still got sick and physicians had to deal with their diseases. Over-prescription of antibiotics had resulted in the survival of the fittest bacteria and the emergence of strains that resisted the antibiotics. The advent of Cybertopia meant that the world's health organizations could keep score better than before. At least there were channels for global distribution of information about antibiotic resistant bacteria. There were databases for recording the mutations and their genomes. These stimulated the search for new

strategies in dealing with the micro-organisms and new pharmaceutical research. (113-A) One particular development of note was the availability of very cheap and effective anti-malaria medications. (46-B)

Personal health records became common. In countries where HIV prevalence was high, these records were mandatory. There were concerted efforts in these countries to notify people who were thought to be sexual partners of a newly identified HIV positive person. In countries where HIV is still not epidemic, health records have become a requirement for decent health insurance. (108-A)

The old measure of “have” and “have not” were not as useful as before. They had been almost totally economic: to “have” meant rich and “have not” meant poor. The rich/poor gap improved greatly (IFs), but some people who might have been poor in other times made the transition through tele-education, telemedicine, and telebusiness partnerships. Some people who might have been richer missed the cyberspace boat and slipped into mediocrity. As we noted, the division between people was not as much by north-south, but by those who act globally through technology and those who don't. The people who were left behind were mostly poor. The sharpest and most poignant divisions are within countries where ghettos of ignorance separate the users of cyberspace from the non-users. The situation was complex because these ghettos overlap to a large degree with the regions of drug use, crime, and poverty. The new platform of the liberals called for minimum levels of access as a social right belonging to all citizens. People in this movement donated used 286's to the poor and called on communications companies to donate access time to poor families. This was an age of individualism however and the broad public response was “Anybody who wants to, can do it on their own. It's much more meaningful to work for it.” (74-A)

Connectivity also fostered crime. It was a new playground for criminals from petty counterfeiters of paper and electronic currency to major adventurers in embezzlement, bribery and theft. The profits were enormous and the exposure was difficult although the same technology that was used to commit the crimes also was used to step up increasingly effective detection. Computer usage was no longer offered as an occupational therapy in penitentiaries; some sentences handed down to convicted felons and terms of parole explicitly forbid the use of computers. (70-A)

International law enforcement also benefited greatly from the detailed international data that became available to search for and track potential terrorists and their modus operandi, including the materials they were typically using. In addition, records of sensitive materials improved. However, the more intensive tracking of suspected terrorists triggered the call for privacy protection and opening of databases to public scrutiny. The pendulum swung between the extremes of these poles, driven it seems by the recency of the latest terrorist act. In addition, there were several cases in which deliberate falsification and deletion of records by terrorists were documented, if the verification itself can be believed. (129-A)

Internet was the medium that the terrorists chose to make the announcement of their nuclear threat. Getting attention to their position and beliefs is one of the principal motivations that drive terrorists to their acts of violence; in the past television and newspapers were the media of choice. Now with instant global access possible, the terrorists broadcast their intent to detonate a nuclear weapon in two hundred of the most populated listserves. The terrorists got their publicity

without scrutiny, without any authentication. The debate that followed centered on the following issues: is the threat credible? Everybody had an opinion, but if anybody had facts, they couldn't be distinguished from those that were just guessing. Is their position justified? A great public debate about the past ills- real or imagined- that led to the current sorry situation. How did they get the material? What is being done about it? And once the terrorists identified the target-city, the mass exodus began. Copycats found it easy to publish in this way, as well. It was a mess, but the outcome was that the threat of nuclear terrorism was now more tangible than it had been. And that you can't tell what to believe of the net. As a result, a profession of on-line authentication grew; news agencies led the way. (3,37,134-A)

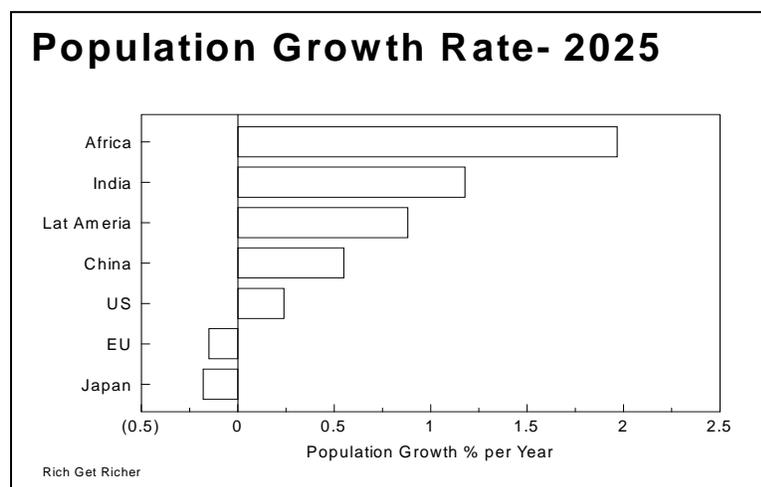
### Case 6. *The Rich Get Richer*

Globalization: Trade Govmt Involvement: Low Communications: Vibrant Security Low

Throughout the twentieth century, the rising inequality of incomes within and between nations had been a matter of increasing concern. (126-A, 74-A) In 1997, the most prosperous group of workers in the world - the skilled workers of the industrial countries, earned on average sixty times more than the poorest group-the farmers of Sub-Saharan Africa. Even on a national basis, taking account of all income and workers, the gap was huge; in terms of GDP per capita, by 2050 the difference between the richest country (the US) and the poorest region (Africa) was almost 50 to 1.

As one looks back from the vantage point of the mid century, it's clear that there were two separate and distinct periods. At the beginning of the century, economic and social conditions in many of the poorer countries deteriorated and the gap between rich and poor countries increased, to the dismay of the world community. In the last two decades, however, conditions in even the poorest countries have been improving and now exceed those of 50 years ago. In other words, through the last 50 years, the rich got richer, and recently- in the last two decades- conditions in even the poorest countries have improved.

It was the pace of change and the challenges of the early 21st century that caused some nations to stumble while others surged ahead. Regions of South Asia - Bangladesh and Sri Lanka; Sub-Saharan Africa - Nigeria, Senegal and Rwanda; and Central and East Europe -Moldova, Romania, and the Russian Republic, were at the back of the pack because the institutional capacity within those regions was only partially effective at managing transition economies, integrating into the world economy, initiating institutional reform, and investing in human capital, human development, and quality education. Take these burdens and add overspending on military preparedness, soaring healthcare costs, relief aid due to outbreaks of infectious disease (113-A, 108-A, 8-A, 48-A) while effectiveness of antibiotics was diminishing (113-A), environmental emergencies (40-A, 127-A), and high unemployment (137-A, 40-B). Corruption and organized crime ( 70-A) made their unholy contributions to the chaos. Inevitably, some of these lagging nations lost credit worthiness, and foreign investment waned.

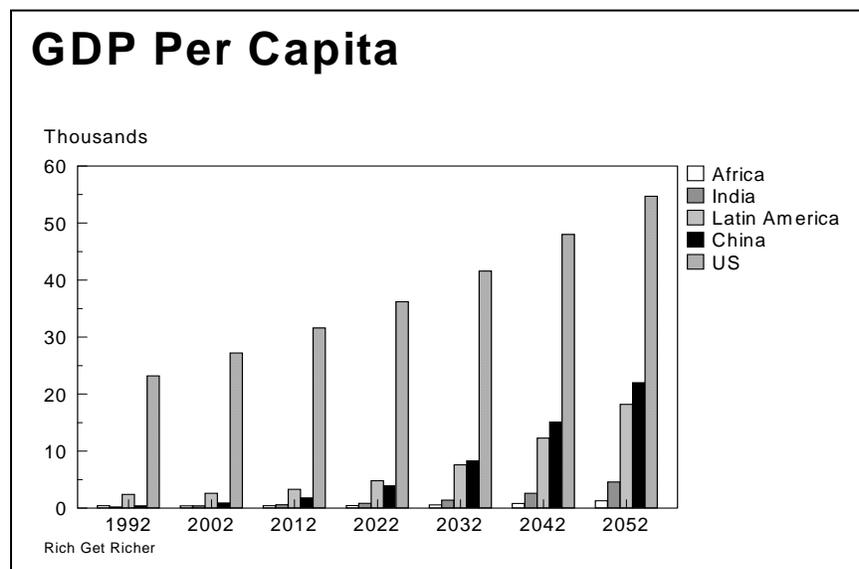


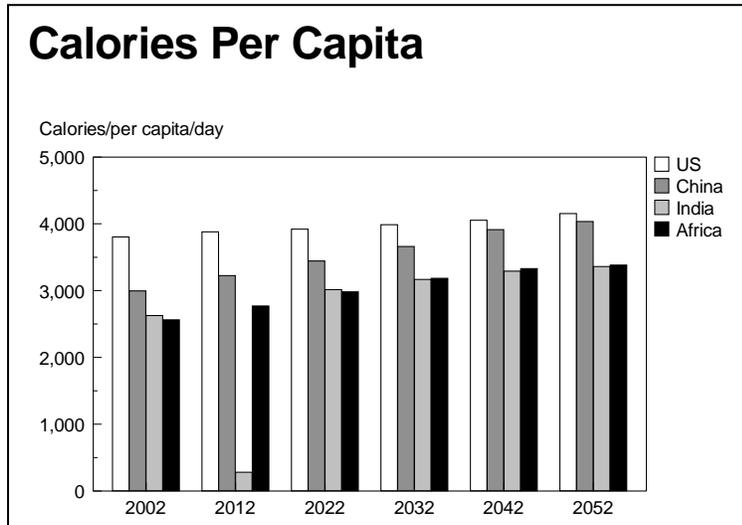
Relatively high population growth early in the century compounded their problems (24- A). Economic growth often promotes diminished birth rates, so the stagnation of economic growth, may tend to make birth rates high. With high birth rates, labor forces grow, and if the economy does not grow at the same rate as population, jobs become precious, and political turmoil follows. It's true that birth rates were falling everywhere, even

in Africa, but the poorer countries dropped at a slower rate than their richer cousins (118-B)

In the first part of the century, the problem set of the poorer countries fed upon itself. While the poorer countries in Africa and Asia ran into this plethora of problems, the richer countries experienced a period of robust GDP growth. Advancements in science led to improvements in productivity (57-B), advances in biotechnology (74-B) and genetics (7-B) improved agriculture, health and longevity, information technology revolutionized education and almost every industry (111- B), and new industries emerged to fuel the economic momentum (29-B). Forces for globalization (55-A) worked to their benefit; their use of cheaper labor in poorer countries was welcomed by those countries because it provided needed jobs. With a few notable exceptions, their foreign investments were generally shrewd, taking advantage of local conditions and need. So while many of the poorer countries were trapped by their own ineptitude and external circumstances, many of the richer countries achieved impressive growth. Communications technologies put the differences in living standards in bold relief and also offered tempting but elusive solutions (e.g., video-education) (111-A). Nevertheless these solutions remained largely unimplemented because of low profit potential and small markets. Thus the differences in income and living standards remained sharp: in the first two decades of the new century, the conditions in the rich countries improved while those in the poor countries deteriorated.

The following charts show this deterioration of the first two decades as well as the improvements that followed.





In discussing the conditions which existed at the beginning of the century it is necessary to recognize two other causes that drove the rich higher and the poor lower: the avaricious nature of global business and the political attitudes of the richer countries. By almost any measure, business went global. Trade was seen as the cure- all of the 21st century, but there were pitfalls along that road. Natural resources were acquired by international cartels with unprecedented speed and scale, and a great portion of the world's natural resources was controlled by private financial powers (75-A). While many multi-national businesses were interested in both profits and the conditions of countries in which they operated, other companies were more interested in selfish aims. Business ethics was a touchy subject.

Those companies that were public spirited saw that their futures were intimately tied to the futures of the countries they served; they formed consortia to promote economic and social development, build health clinics, disseminate information and the means for attaining it. But with the unscrupulous organizations, if protection of the environment of poorer countries got in the way, the environment suffered. (A-127)

In retrospect, in the 1990s there might have been real possibilities for closing the gap through public policy. For instance, the United Nations Development Program (UNDP) in 1996 claimed that the costs of eradicating poverty worldwide were less than people imagined - only about 1% of global income. The Copenhagen 20:20 Initiative became the 20:20 Vision when it was endorsed by the World Summit for Social Development in 1995. This Summit, attended by many of the world's leaders, promoted the idea that governments should allocate about 20% of their budgets - and donors 20% of their aid budgets - to basic social services, sufficient for universal coverage. This, they argued, would cause the worldwide wage disparity gap to converge. However, this was just not at the top of the priority list.

Perhaps simple funding measures would have worked but the world wasn't listening. The rising tide, it was said, would raise all ships. Therefore the most appropriate strategy was to promote the growth of the world's economy. The poorer nations should develop their own effective

institutional capacities and economies; giving aid only delays self development. You know the story: give a person a fish and they may not starve today, but give them a fishhook and teach them how to use it and they will become self-sufficient.

Governments in this era did not perform well. Corruption abounded. Increasing complexity of the issues outstripped the ability of institutions to anticipate and deal with them (A-12). Some governments abdicated their responsibilities in public health as a result of budget and other problems (A-58). Large-scale projects, once thought to be the life-blood of development turned out to be inefficient (LOH-8). Businesses were welcome because they brought jobs, technologies, income, investment, but the money flowed out of the countries. Dictatorships gave way to democracies (108-B) and in the democracies aggressive capitalism was the rule.

The wars came. The seemingly unending sub-Saharan wars led South Africa to spearhead a campaign for African unity, patterned after the EU. The unity movement reached its peak in 2015 when the countries met with hopes high in a New African Congress, but despite promises, internecine interests prevailed and the effort dissipated. (1-LOH) There was also a brief moment in Asia when unity seemed a reality. China, India, and Islam convened to try to establish a cooperative sphere. They saw it as possibly leading to a multi-civilization world where plurality and respect for differences would become the norm. (13-B) But once again, frustration arose in implementing meaningful agreements.

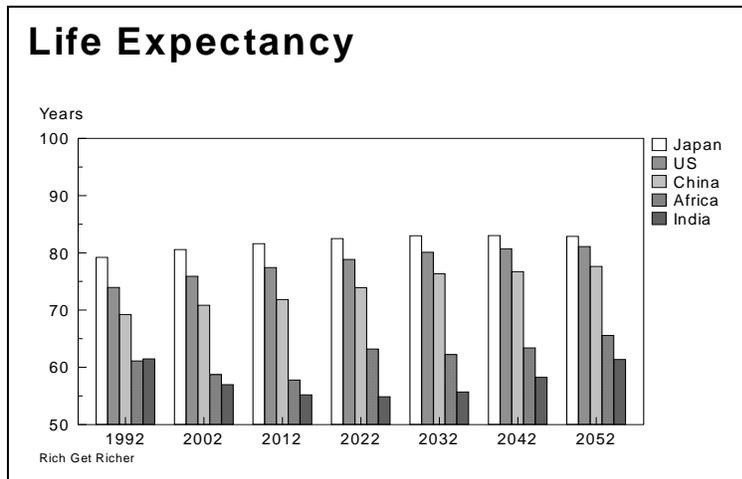
The uprisings of 2020 followed these frustrations. They seemed to be triggered by tensions associated with migration (52-A, 34-A), water shortages (40-A) and deteriorating environmental factors (21-LOH, 127-A). All the while the rich countries prospered.

And then things changed. Why they changed is still a matter of discussion among economists and policy experts. But the predominant feeling is that the important 1,000 world corporations, led by the few that showed the way early in the century, established beyond a doubt that the way to corporate success in the global economy was through the development of markets. This meant that buying power of the populations of poor countries had to grow in order for those people to become customers. So the companies, sometimes in global consortia, exhorted by charismatic leaders (LOH-12) built clinics, paid wages on a world scale, introduced new technology that both increased productivity and increased the number of jobs, added foreign nationals to their Boards of Directors, and provided corporate support for sustainable concepts (B-41).

Under a moral injunction, corporations involved in this campaign refused to pay corrupt bribes to high officials. Honesty, integrity, helping people became guiding themes. There were cynics, of course, but the demonstration projects of these consortia eventually dispelled the doubts. These actions were not wholly unselfish; the participants reasoned that the only way that their companies could expand was through the growth of new consumers in the nations that were currently poor. And the markets grew.

As a snapshot, at the turning point of 2025, life expectancy on the African continent was 63 years; in Japan it was 82.5 years. The per capita GDP in the US was about 36,000 dollars; in India it was 850 dollars. (Ifs) Quite a gap, indeed. The number of people with incomes of less than \$1 day increased by almost 100 million to 1.3 billion - and the numbers were growing in

every region except Southeast Asia and the Pacific. Poverty in Sub-Saharan African and other least developed countries had deepened, with per capita income falling to \$325 by 2025. By 2025, the gap between the richest skilled worker in the OECD countries and the poorest farmer in Sub-Saharan Africa widened to a ratio of 80 to 1.



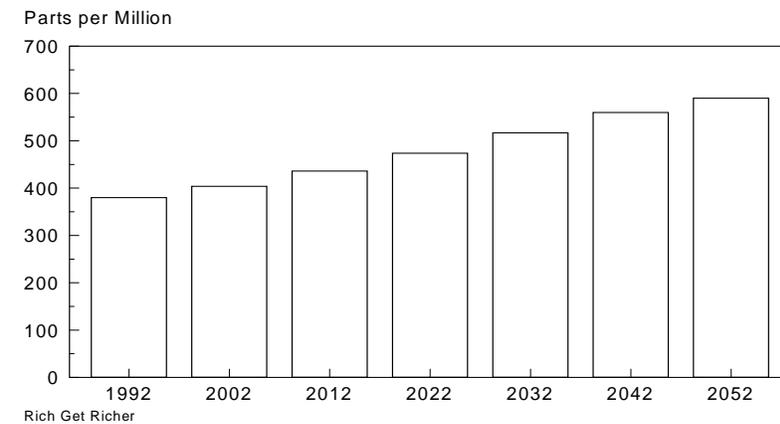
So at this turning point, the foresighted Trans National Corporations (TNCs) had begun to provide jobs at internationally standardized wages (a move that delayed the formation of effective international unions), and, through their policies in the host countries, to encourage real development of markets. They invested in human development, micro-credit, women, and education (117) and environmental resource remediation and national economies grew.

They also were driven by the new environmental imperative (40- B), and as the corporations contributed to and accommodated the reality of global warming, they fostered growth. The year 2025 was the benchmark of environmental changes caused by global warming (127-A). In 1997, scientists at the Kyoto conference on global warming warned that the most effective action - the only action - that would work to solve the global warming crisis was to reduce greenhouse gas emissions worldwide 50% by 2012. This was perceived as folly and proved to be impossible in a world already entrenched in an energy economy dependent on fossil fuel and coal. Despite the compromise agreements reached at Kyoto, by 2025, it was clear that the Kyoto agreements were too little too late. The world was warming, no doubt about it.

The U.S. Energy Department and scientists worldwide asserted in the 1990s, that the technology to make the change to a successful alternative energy economy to lower emissions had already existed; the backbone was there, but all that was needed to diffuse that backbone was investment. Yet, regions that were already struggling from the inherent challenges and inequities of a global economy - Central and Eastern Europe, the Middle East and North Africa, Sub-Saharan Africa and South Asia - had to, out of necessity, continue to depend on fossil fuel and coal in order to survive. (27-A, 57-A). Those regions that had successfully integrated into the global economy and had taken the primary responsibility to lower emissions - the OECD countries, and to some extent East Asia, and Latin America (by 2025), had made partial transitions to alternative energy sources.

The business opportunity was clear. The Trans National Corporations aggressively invested in alternative energy systems (106-B, 42-B,). Meantime, developing countries continued to depend on fossil fuel for their economies in order to survive (30-A, 135-A).

## Atmospheric Carbon Dioxide



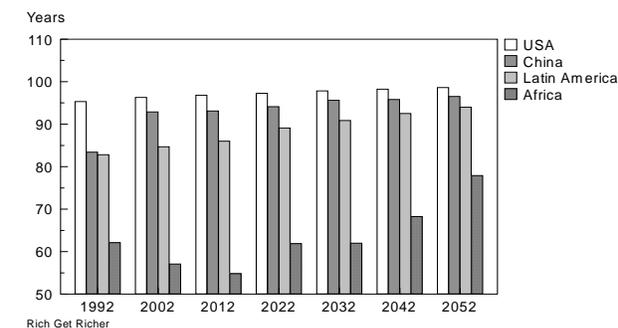
The time required to reduce the rate of introduction of carbon dioxide into the atmosphere is long indeed, but at least vigorous action had begun by 2030. Multinationals involved in the alternative energy industry and other industries rose to the occasion and created whole new industries of power generation, devices that were designed to improve efficiency, low energy agriculture, energy-efficient cars; experiments had begun

on the next class of safe nuclear power reactors and hydrogen-fueled systems.

As economic conditions improved, population growth rates dropped.

In the EU and Japan, questions were raised about the long-term vitality of societies that were diminishing in size as rapidly as they were.

## Physical Quality of Life Index



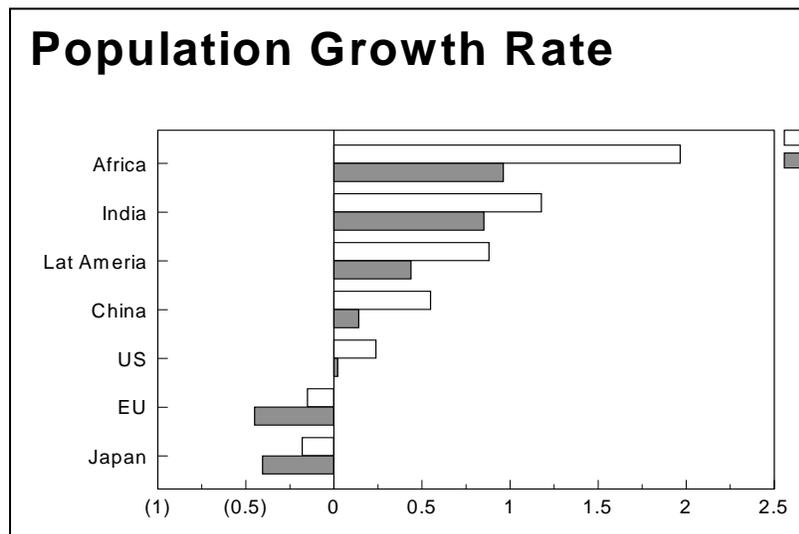
So at the midpoint of the 21st century the world finds itself with populations that generally have improved their living conditions. Life span has increased (139-B), health has improved; women are more effectively integrated into the labor force; communications and information systems have brought high quality education (111-B) to every village. Poverty remains, to be sure, but vigorous capitalism and global trade have led to a world that eluded the policy makers of the last century.

**Case 11: A Passive Mean World**

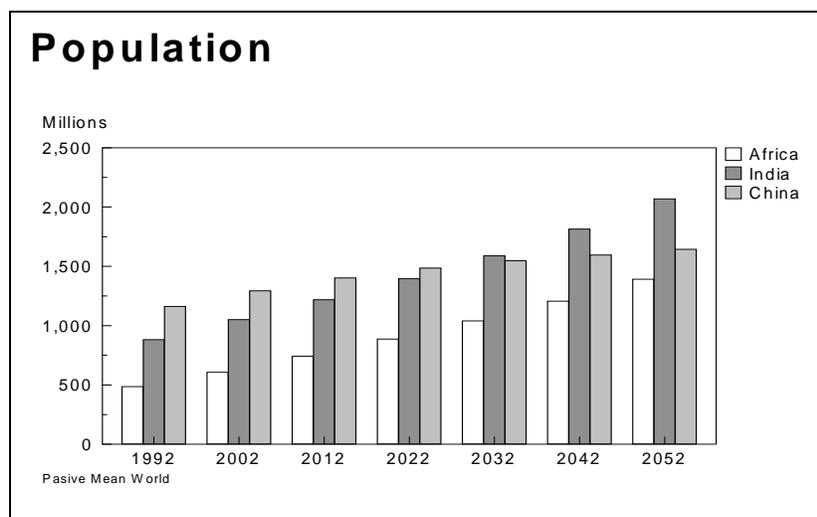
*(Extended from the Millennium Project 1996 Mean World Scenario)*

Globalization: Isolation Govmt Involvement: High Communications: Stagnant Security: High

Jobs are the problem. In the simplest of terms, population growth outpaced the rate of job creation almost everywhere. In some places the difference was small, especially within parts of the newly developing countries that traded within the three trading blocks - the EU, Latin America, and the Pacific Rim. In other places, such as Africa, jobs - real jobs - were a precious commodity. For example, in Africa by 2010, there was a surplus of a million people in the manufacturing sector, and almost two million in agriculture. (IFs)



While population growth rate diminished from the highs of the mid 20th century (118-B) as a result of somewhat improved literacy, and empowerment of women, the levels achieved disappointed many demographers who had been expecting a steeper decline. Population almost doubled in parts of sub-Saharan Africa by 2025, and in Asia, the world's most populous countries experienced rapid growth. By 2025, India's population passed China's. (IFs).



Population growth outpaced job growth in most regions, and the concomitant unemployment and under-employment produced pressure on economic systems and fostered political unrest. Social interaction grew- much of it transnational through Internet. People with like interests and gripes found each other around the world, compared notes, and strategized; they formed communal enclaves, and engaged in on-line bartering.

The lousy economy and unemployment generally led to downgrading the priority of environmental issues (39-A). "Let 's solve our most important problems first", the politicians said. Nevertheless, because economic activity was subdued, the carbon dioxide in the atmosphere - and atmospheric temperature - were a few percent lower than they might otherwise have been. (IFs). It was in the public attitude and political spirit that the change could be most easily seen: despite the hopes of some planners early in the century (40, 65, 106-B), sustainability had a distinctly antique ring.

For the advanced industrial nations the lack of solid employment was the result of a slow-down of growth and bad strategy along the way. For the United States and other developed nations this was particularly tough since unemployment had been so low in the 90 's and full employment was the underpinning of the promised balanced budget. GDP growth rate stagnated in most developed countries. US GDP growth rate was less than 0.3%. (IFs) The Chinese and Latin American economies, while not spectacular, at least were positive and led the sluggish world economy. Where unemployment was high, time hung heavy. For many would-be workers, time virtually stood still.

As members of the principal trading blocs, the advanced industrial nations were certainly among the "haves" of the world, but raising living standards was most difficult, especially for Western Europe, North America, and Japan. Growth in productivity continued, but it was slow. Productivity increases meant that more could be accomplished with fewer people, exacerbating the pressures on employment. Many manufacturing jobs were exported or "contracted out", while low-wage service jobs were created, but many people could hardly make a living. High-tech engineering and "customizing" jobs were created as well, but the knowledge and competence required for these jobs was very exclusive.

Some economists hoped that nanotechnology and biotechnology would provide the catalysts for new growth by 2025 (23, 75-B), but development in these fields continued to be highly specialized. By 2025, the aging of the population, national debt pressures on public spending and entitlements, and pressures on natural resources dramatically curbed improvements in living standards. Although artificial financial and market mechanisms were able to prevent a 1930s-like crash from happening again, living standards grew slowly in many developed countries and in Latin America or, as in Africa, dropped significantly. The movement toward democracy that had been largely attributed to the globalization of markets, stagnated. (1, 108-B)

By 2025, the down-scaling of expectations led to vast discontent, absolutist passions, and an incredible distrust of government. (20-A). UN reform essentially ceased. (52-B). The US was hit hardest by these conditions because it couldn't re-establish the idea that work was a virtue and there was a need to sacrifice for one's country- attributes of the Japanese labor force after W.W.II. Similar conditions existed in some parts of Europe as well. It was indisputable that by 2025, the advanced industrial nations were becoming nations of discontent.

Companies, particularly large companies and multinationals, attempted to "rightsize", but with a fiercely competitive global economy, companies continued to undergo an enormous pressure to control the growth of employment. Reengineering, reinvention, restructuring, repurposing.... every time there was a shift, managers would ask, "Have we got it right this time? " Many big

companies were too inflexible to keep up with the pace of change and constant shifts in ownership. For the advanced industrial nations, it was small businesses that controlled small but profitable niches. The Virtual Corporation became the key competition to established corporations across advanced societies. In the eyes of the average worker in large corporations, corporate culture was a chameleon - it changed so often in size and shape, that it was hard to imagine what it would be like to have a lasting and stable relationship.

To navigate a career in this turmoil required entrepreneurial, high-tech, non-linear thinking. In the 1990 's there was confidence that the spread of the home business would provide a magic solution to the lack of jobs, but very quickly, this segment became saturated, highly competitive, and highly specialized. For people who were not "high-tech", "non-linear", or "entrepreneurial" enough here were two alternatives: low wage service jobs and joining the contingency workforce. The contingency workforce originally grew out of the increase of temporary service agencies, and its sheer size literally tipped the scales of labor forecasts 20 years earlier. The contingency workforce was huge and transient, composed of individuals traveling from coast to coast, or in some cases, country to country, just to find a job. Micro-entrepreneurship (the Grameen Bank plan in which small sums of money are invested in micro-businesses, a plan originally initiated for people in poor countries) (19-B) was spreading to the US, the EU and Eastern Europe. "Drifting" and "dancing" were the terms - drifting to a job, dancing-a-dance to turn it into something real, then drifting to another job. For the job-mobile people, divorce was a risk, for it was difficult to stay married or have a family or home; homelessness in fact, spread like a disease. Benefits packages were wrapped individually on smart cards in back pockets, paid for by the worker if he was lucky enough to land a job by passing the criminal and medical-record scrutiny that his "smart" card revealed.

The winners in 2025 were the newly developing economies that functioned within viable trading blocs. But for the advanced industrial nations and for "the rest of the world", it was a mean world indeed because the economic pie had been discovered to be zero sum.

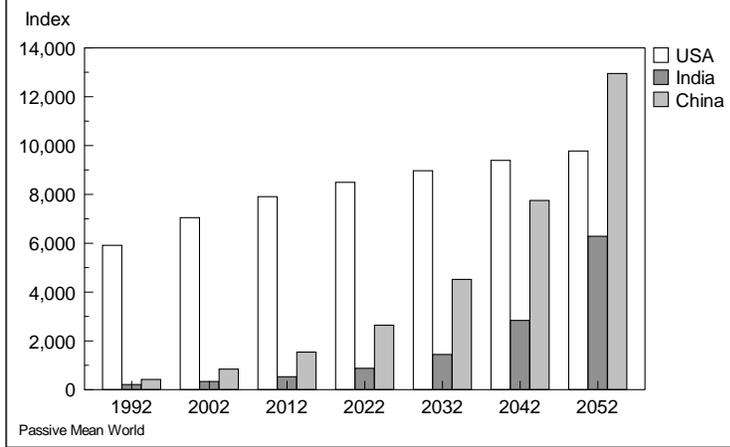
The newly industrializing nations increased living standards by relying on productivity gains as their countries industrialized. It became clear that the new industrial world of Asia would benefit from the existing market system far more than the old industrial world by 2025, and far more than "the rest of the world". The trading blocs were driven by the European Community's push for financial integration, the economic powerhouses of the Pacific Rim, the actions of the U.S. in North America and the extension of NAFTA to Central and South America, and the rate at which Latin American countries democratized and created freer markets. These blocs emerged originally as a way to facilitate trade, but they became very rigid and competitive- viewed by some as responsible for the lack of jobs back home. Yet, within the trading blocs, in some places, ethnic conflicts raged. (23, 33-A)

By 2025 trade wars erupted between the blocs. Protectionism came in many forms and all the methods were used somewhere: non-tariff barriers, protection of intellectual properties, restrictive immigration policies, content laws, price regulations. The multilateral free-trade principles that were developed in the 80 years after W.W.II and represented by GATT and WTO, came under increasing pressure. Trade diminished. While world GDP per capita grew slightly, the trade as a percentage of world GDP dropped. (IFs) Free trade had never been extended to

most agricultural products or many services, but the agreements that had been developed for trade in goods had fallen apart. The US and European Community closed their markets to the newly industrializing tiger nations, and trade liberalization came to a halt. And jobs outside of the newly industrializing countries continued to diminish.

Planners had hoped that development would be fostered by the standardization of programs in various regions of the world (73-B); this hope never materialized.

### Gross Domestic Product

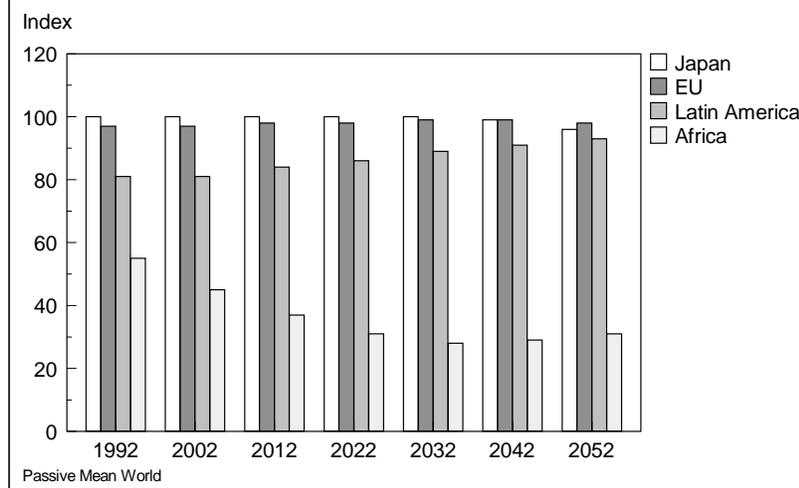


Among the newly industrializing nations, there was one powerhouse: China, with another not far behind: India (IFs). Neither of these two countries was faced with "the year 2000 problem" since their computerization was recent (it was old mainframes and software that booby-trapped the OECD countries). The geographic regions of these countries that flourished, flourished dramatically; elsewhere conditions were less sterling. Overall, living standards increased rapidly, enabling both countries to survive huge mistakes in economic management.

They rivaled the US for world leadership by establishing a fairly respectable market economies and human rights record.

Financial tensions grew more dangerous after 2025. The US, EU and Japan were net debtors, as the global primacy of the dollar, yen and euro gave way to a basket of currencies and SDR's. Latin America, China and India were suppliers of capital. (IFs) In the U.S., Treasury auctions were always precarious; the question was "will we be able to sell them more debt?". A very populist US government (already distrusted by some constituencies), began to think seriously about "nationalizing" certain foreign-owned assets.

### Physical Quality of Life Index



Such were the problems of the "haves" of the world. Most countries agreed that the have-not gap" was extreme. (74, 126-A) But even for those countries on the top, it was a mean world. People grew tired and dispirited.

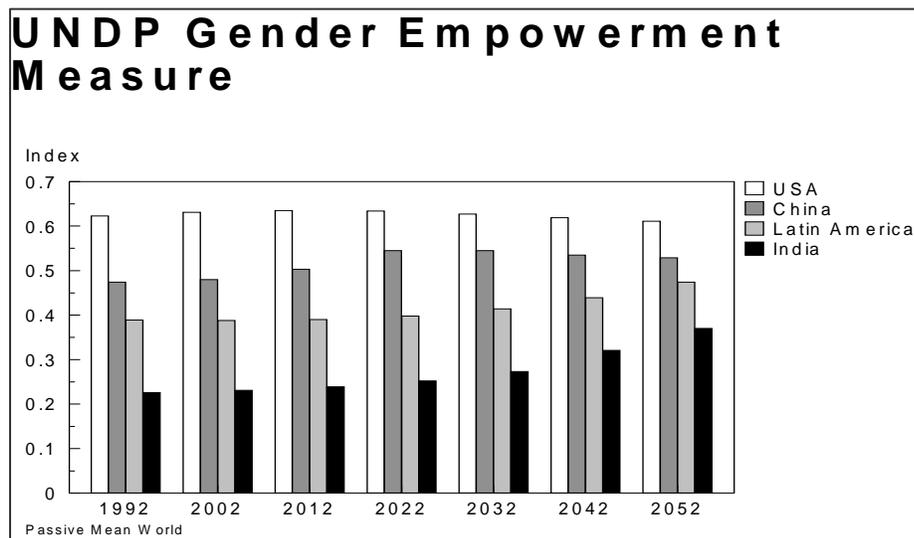
Crime and corruption increased. Attempts to convince people that they were better off were greeted with appropriate cynicism.

As for the "have-nots", or, the rest of the world outside of the newly industrializing countries, relative peace and security was rare. This was especially true among the countries on the continent of Africa and areas of Asia that were not a part of the Pacific Rim: India, Pakistan, Bangladesh, Vietnam, Laos, Cambodia, Burma. Where people were very poor, civil unrest and conflict often followed. Against these pressures, efforts to develop non-violent means of conflict resolution (129-B) seemed vague and academic. Demagoguery abounded. Nationalism increased. Military forces were building. Tensions were increasing. International institutions lost power.

The United Nations maintained a semblance of coherence through a strategy of restructuring after the model of the Virtual Corporation, then creating a network of envoys that would organize around a crisis, then disband when the crisis was over. This had the advantage of a diminishing the size of UN agencies, increasing accountability, and raising its profile for the media, since the focus shifted to the "crisis" at hand. This reorganization enabled the UN system to survive, but it was severely weakened by the multitude of geopolitical "crises." (23, 33-A) It was in fact, impossible to lead a world of rigid trading blocs and so many political fragmentations; a world in which the "haves" focused inwardly, and where the "have-nots" were in turmoil and fragmented. (12-A)

The UN extended its programs for improving employment via micro credit and village enterprises: it used electronic networks and Web pages on the Internet, brochures, lobbying of governments (111-B); but for the most part, the world was involved in the problem of survival, and there was very little time to think about global vision. (55-A)

One bright spot was the emergence of women in the economy who increased their role in government and business. Almost everywhere, women, to a greater extent than ever, were part of the paid economies.



There was very little time to grasp the complexities of the world as well. The economic and employment changes had occurred so rapidly that nation-states were largely forced to act before thinking; the US was especially vulnerable because it felt that it had to maintain a leadership position - that is,

excellence in technological innovation and in implementing strategy, but conceptual thinking, reflection, and vision were rare indeed.(67-A)

By 2025, this mean world turned dangerous. When the stifling but stable bipolarity of the Cold War gave way to an unbalanced multipolar world, regional conflicts - some based on ethnicity-developed, and the world became progressively less stable. The destabilizing dynamics were very subtle, but at the heart of the matter was the lack of meaningful work. Jobs were the fundamental problem. All else, some said, came from that. The Western Alliance (that grew to include Russia), thought at first that regional fighting could be managed with traditional leadership, global institutions (including UN peacekeeping forces), and new methods of high-tech negotiating. But the drift toward instability, fueled by underemployment, continued to spiral downhill, the forces magnifying from their own consequences. Countries outside of the functioning economic blocs were engulfed in the rise of angry ethnicity, resurgent nationalism, cultural antagonism, and spreading anti-Western ideologies. Add to this the backdrop of rising expectations amid deepening poverty, dwindling resources such as fresh water and food, (40, 39-A) (127-A), and a slowing world economy (130-A).

In this environment crime and terrorism grew. (23-A) Modern conventional weaponry and nuclear weapons and raw materials flowed from country to country. (3, 37, 129, 134-A) For the first time in history, the world gained a capacity to wage war from countless pockets of groups in many different areas, in many different directions, and on many different levels. "Military" was no longer defined solely as the military arm of a nation-state. It was rather defined- at least in part, by terrorist groups, criminals, and small enclaves of people who thought they knew how to solve the problems, who knew the "right formula" at the "right time." Trading and economic blocs merged with mutual defense blocs; the alliances grew teeth. So did the non-allied.

RAND had been prescient: in a 1995 report, they wrote that if it were ever possible to imagine a dangerous world, the worse case scenario would be something like "a world combining the negative features of nineteenth-century geopolitics, twentieth century political passions, and twenty-first century technology." This was nearly the case in 2025, except that the world was driven more by economic passion than political passion, for it was a matter of survival.

Against this background rose the belief in belief. Faith in community, in religion, in the sanctity of the group. If we can't watch out for one another, who can? The methods of governance, of management, of science all came under increasing disdain. Science, particularly, with its claims that new theoretical principles could yield great improvements in energy, information systems, and material processing (57-B) was distrusted. With the available information and communication systems, it was easier to retreat into enclaves of like-minded people, no matter where they were geographically. The cybermedia provided an easy way to search for jobs if one had access, escape (a way to use unwanted leisure) for others that had given up, and, for others still it was a way to meet like-minded people. Those cyber meetings of peers tended to cement attitudes, segment we from they, and, solidify the seditious rumblings and feelings of dread that pervaded this passive mean world.

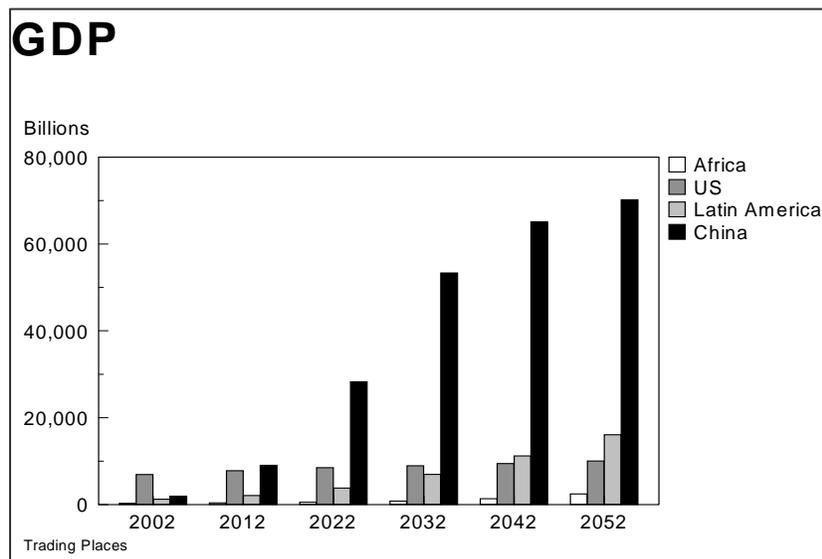
### Case 7: Trading Places

(Adapted from a 1996 scenario developed by The Futures Group for NASA)

Globalization: Trade Govmt Involvement: Low Communications: Vibrant Security Low

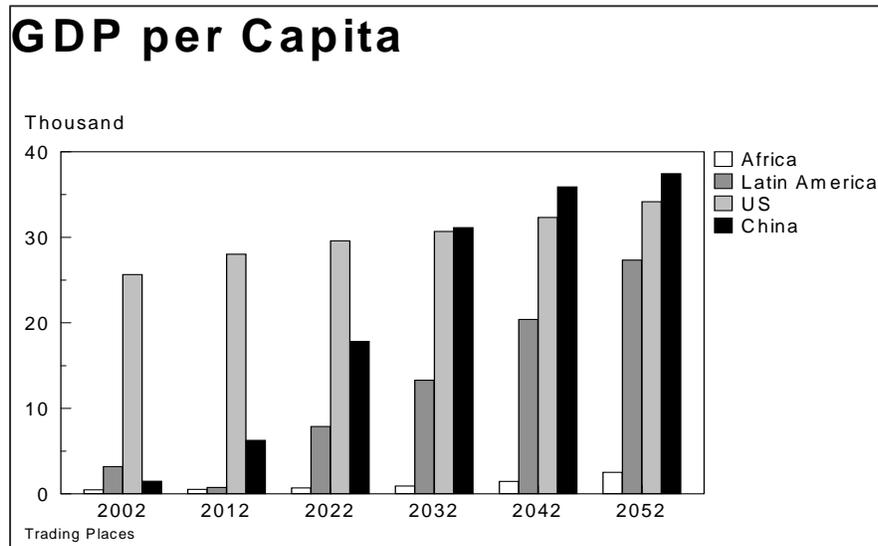
From this 2050 vantage point, it is clear that the past five decades have witnessed extraordinary shifts in global economic and political power. The booming economies of East and Southeast Asia have recovered from their meltdowns of the late 1990's and grown and challenge the economic dominance of the US, Western Europe and Japan (IFs). U.S. GDP growth averaged a paltry 1.5 percent between 2000 and 2005 and then dropped further (IFs). The GDP growth rate of China remained at double digit levels through the first part of the new century and then began a slow decline to a rate about equal to the US (IFs). The North/South gap that so preoccupied economists in the late 20th century (74-A) has narrowed and the concept of balanced equity among nations seems archaic.

Technological innovation, too, was increasingly centered in the Pacific Rim, as companies geared their research and product development to satisfy the wants and desires of the middle classes of China, India, Korea, Southeast Asia and, to a lesser extent, Latin America. The U.S. and Western Europe muddled through with sluggish growth, and heavy social burdens related to aging populations.



Improved economic development brought increased life expectancy almost everywhere, but the greatest surge was in China. Latin America reached parity with the US. Even Africa showed gains but still lagged far behind the rest of the world. (IFs). Why did this improvement occur? Empowerment of women, dismantling of patriarchal structures and laws, improved literacy, improved and inexpensive contraceptives, and simply, affluence. (118-B)

In the West, as the emerging countries began to develop their economic potential, governments of the developed countries were pressured to do more with less. Privatization and deregulation offer only partial relief to strained government budgets. In the U.S. and Western Europe, unemployment was relatively low but underemployment, high. Consumers worked hard and long hours, with little leisure time.



GDP per capita in the West was growing to be sure, but the growth in the East was so impressive that there was a resigned feeling in the West that the golden age of the 20th century had disappeared and it was the turn of the Eastern countries, particularly China and India. Africa was completely left behind (IFs).

For most, life was hard - at least by comparison with the past, but still bearable. There were inevitable conflicts between social and economic aims (9-A); attention to the environment and ecology- so promising a development at the turn of the century (40, 65, 106-B) took a back seat.

There was a sense of inevitability to the tremendous changes that were taking place in the global economy. However grudgingly, consumers accepted their diminished status. Mature market consumers were still the most materially fortunate in the history of the world. It is just that the rest of the world was catching up at breakneck speed or had already surpassed the West.

At the turn of the century, the original Group of Seven industrialized countries (which at that time included the United States, the United Kingdom, France, Germany, Italy, Spain, and Japan) saw great promise in the then-underdeveloped but rapidly growing economies of China, India, Indonesia, and the other export-oriented economies of Southeast Asia as well as those of Latin America. What the mature economies failed to realize at the time was the extent to which their own economic problems and declining competitiveness, in the context of free and open global markets, would accelerate the progress and development of the emerging market countries and significantly narrow the gaps between the "haves" of the mature markets and the "not yet haves" of the emerging markets. The ascent of the latter has been no less than remarkable, as symbolized by China and Korea's admittance to the world economic power club. Today, it is known as the Group of Eleven (and growing).

U.S. and EU investment in the Pacific Rim progressed at a steady pace through the end of the 1990s and the early 2000s. Though the majority of dollars, pounds, and marks found their way to Asia, select Latin American countries, notably Chile, received attention as well. Chile itself grew increasingly integrated with the Pacific economy. In the process, truly global companies emerged, with the ability to rationalize R&D, sourcing, production, distribution and servicing on a worldwide basis.

The international monetary system survived but was in disarray as the dollar became less stable. (130-A)

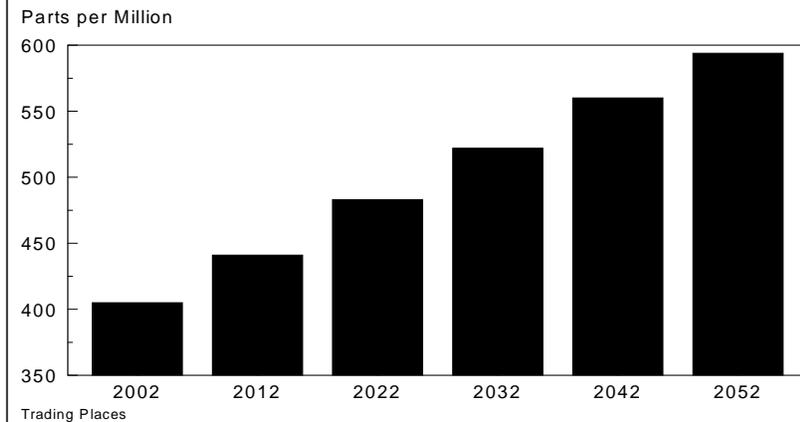
Increasingly, the national origins of most of the world's large companies became difficult to determine. Advanced telecommunications, the explosion in privately developed information networks, and widespread commercialization of the Internet were important to this industrial globalization (111-B). Trade barriers dropped - there was no point anymore in trying to shut out another nation's goods and services; there was room for everyone - a greatly facilitated global commerce. The nascent but highly effective World Trade Organization kept all the players honest.

At first, in the West, the U.S. and European economies appeared deceptively healthy. The EU had extended to the East (107- B), and both the US and the EU were benefiting from the robust trade with the developing world. Lower labor and manufacturing costs that came with the move of factories offshore caused corporate profits to hit record levels. U.S. and European stock markets soared. In Washington, tight fiscal policies enabled the government to stem the increase in the national debt. To many citizens' amazement, the budget was actually balanced by 2002, without including social security income, as promised back in 1996, and the nation had begun to dig itself out from under its heavy debt burden. Confident in this perception of economic and corporate health, in the US and in many other developed countries, some leading-edge baby boomers started retiring at age 55, and didn't seem to mind when Washington made cuts in Social Security and Medicare benefits to help balance the budget. They didn't need to worry; their investments and retirement provisions promised a very comfortable lifestyle.

In reality, however, serious economic problems loomed just beneath the surface. By 2004, a large and rapidly growing share of the intellectual and physical assets of key sectors such as automotive and electronics was located in China, Southeast Asia, and Latin America. The U.S. aerospace industry was hanging by a thread. The high-wage jobs that were the hallmark of these industries were much reduced. This sparked opposition in the U.S. and elsewhere, but no large-scale revolt. People still had jobs and managed to pay their bills. Besides, consumers had grown smarter about world trade matters. They liked the inexpensive and world quality imported goods to which they long enjoyed access. The argument was that export of jobs helped to narrow the gap between "have" and "have not" nations (74-A). The last thing any country wanted was a trade war.

Across Asia and Latin America, rapid and sustained economic growth created a shortage of managerial and technical human resources. As a result, foreign (and especially Asian) enrollment in U.S. engineering and management science programs skyrocketed. So great, in fact, was demand for advanced training that many top flight schools opened up campuses in Asia. Governments and multinational companies expanded sponsorship of advanced studies in the leading U.S. and European universities (57, 69- B).

## Atmospheric Carbon Dioxide



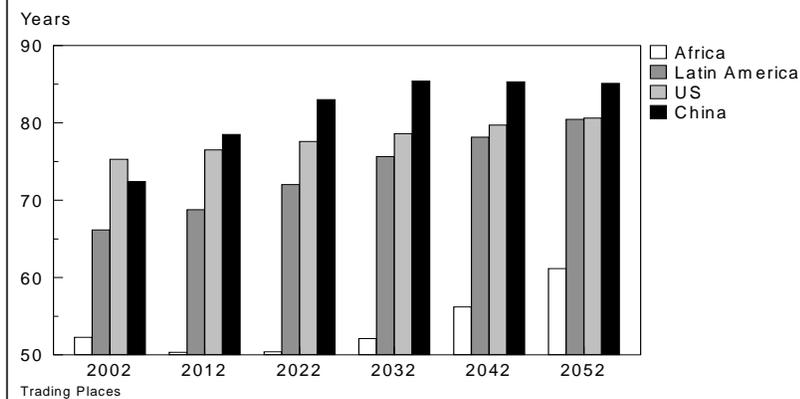
The environment suffered. Fresh water was in short supply in many regions (40-A) and sustainability, once the focus of global policy (82, 65-B) took a second place to concerns about economic development. (127-A). Atmospheric carbon dioxide increased by 50% (IFs).

True US and EU leadership remained concentrated in non-manufacturing industries like information technology, health

care, and pharmaceuticals. The pharmaceutical industry was boosted by the appearance of new diseases and the reappearance of diseases once thought to be under control, the development of new vaccines, and advances in biotechnology. (48-A) (101, 75-B). Furthermore the number of microorganisms found to be immune to antibiotics gave impetus to research in new ways to bolster the immune system. (113-A)

Globalization brought the need for clear global thinking (55-A) but it seemed that the issues involved grew in complexity and the national institutions designed to cope with these issues became subject to mental gridlock. (12-A) (67-A). The hoped-for reform of the UN (52-B) never materialized to any great extent.

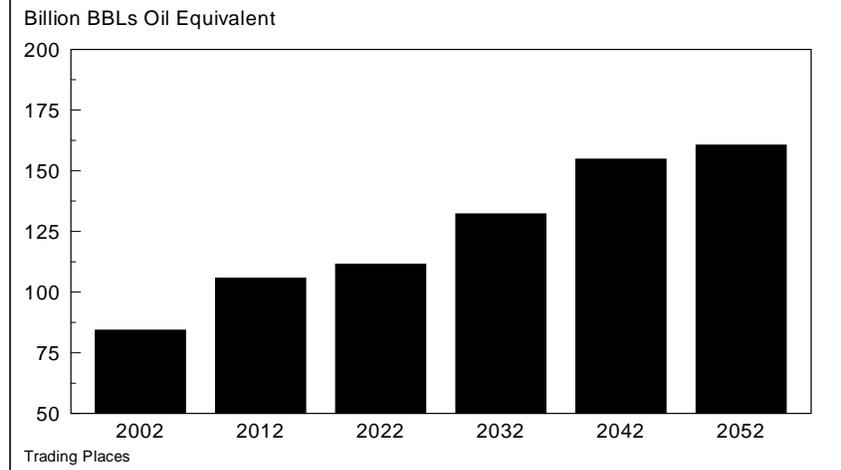
## Life Expectancy



China and Southeast Asia, meanwhile, capitalized on the problems of the increasingly aging and noncompetitive markets of the West. Singapore emerged as a strong financial market after a series of trading scandals in Tokyo shook investment markets in the early 2000s, setting the government on a strict financial markets reform binge. Asian companies succeeded at gradually increasing their ownership shares in

formerly U.S. and European manufacturing assets. Likewise, Asian companies and governments accounted for a very high share of Internet traffic and, before long, took the lead in creating their own Asian language information networks and communication protocols.

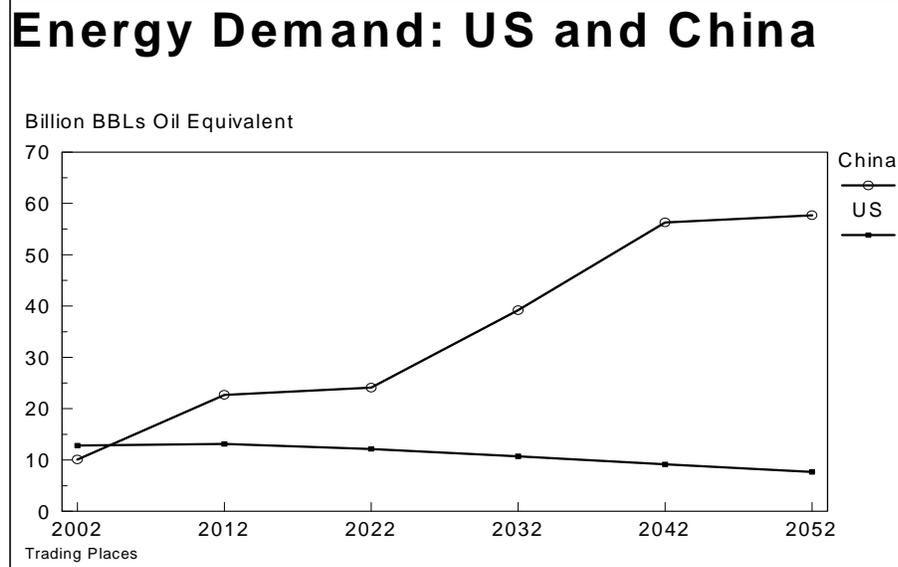
## Energy Demand: World Total



The internal markets of Asian countries "took off". By the turn of the century, China boasted the world's fourth-largest market after the United States, the EU, and Japan. By 2020, China's market ranked first. (IFs) Many Western pundits had an exaggerated sense of China's frailties. Food scarcity was a continuing threat (39-A) but as China and other Asian giants developed their markets, the threat was diminished through imports.

The convergence of a loss of Western industrial leadership in key sectors, growing Asian economic and political power, and structural economic problems in the U.S. set the U.S. economy on a downward slope. With the bulk of the U.S. labor force increasingly finding employment in low-wage service jobs, U.S. tax receipts declined. This coincided with the bulk of the baby-boom generation's entry into old age, placing enormous pressures on the tinkered-with-but-unreformed Social Security and Medicare systems. The increasing political power of this demographic group made it almost impossible to achieve structural reform in the entitlements system, causing the U.S. budget deficit and debt to balloon to levels that surpassed the debt of the early 1990s, sending the nation into recession. Unemployment grew, underemployment was severe, and overall consumer confidence was at a 20-year low. In a much ballyhooed event, U.S. and European governments held a conference in to discuss ways to achieve drastic reform of their beleaguered social welfare systems.

Significant research and development capacity followed U.S. and European manufacturing overseas, and what little R&D was left - in biotechnology and vaccinology, for example (101, 74-B) was cut to the bone by short-term-minded corporate leaders trying to squeeze even more profits. Real economic recovery would not occur until later in the century. At the same time, the foreign students that streamed into U.S. colleges and universities were returning home to capitalize on the opportunities there at the same time that U.S. applications dropped. College had become an increasingly unattractive option for many; the lack of high-paying jobs hardly makes the average annual tuition of \$100,000 worth it. Very little new intellectual capital was being generated in the United States.



As 2025 approached, Asian economies came into their own. Japan got its financial house in order and was once again a strong investor in the region. China and Southeast Asia were on their way to becoming industrialized societies and assumed solid leadership in several sectors especially those that were technology and R&D-intensive. Women in these countries increasingly

contributed to the economic explosion. (117-A) (118-B). There was a false sense of security about the extent of natural resources (14-A), and with the economic expansion, particularly expansion in China, world demand for energy doubled by 2050 (27-A).

When China began mass producing and exporting a new kind of biochip - a device that transformed artificial intelligence into the real thing - China was finally able to tout its status as a world leader in both biotechnology and computer hardware. Before long, almost every Asian economy found its industrial niche: in Malaysia, it was automobiles - an affordable car that produced only 1/3 the amount of CO<sub>2</sub> (23-B), India, software, Indonesia, aerospace. In Latin America, Mexico, and Brazil were the regional hubs for automotive manufacturing; Chile was the leading developer of Spanish-language software.

There was a dramatic shift in political and military power eastward. The threat of nuclear conflict still existed (129-A) not only because nuclear stockpiles still existed, but because there was real concern that some terrorist groups had achieved nuclear capability. (3, 37, 134-A). Distrust of U.S. motives in the Pacific Rim remained strong in the aftermath of the ill-fated U.S. trade war with Beijing, and few tears were shed when Washington announced that it would relocate more than 80 percent of its military assets in Asia back to the U.S. due to budgetary constraints. China, which had invested heavily in its military and now possessed state-of-the-art fighter aircraft and naval platforms, quickly stepped in and became the dominant regional military power. It resurrected the Southeast Asian Treaty Organization and with some persuasion induced its southern neighbors into a rigid security pact; even Vietnam felt compelled to join. To the north, Japan, still wary of Chinese military intentions, struck a tenuous security alliance with Russia and India.

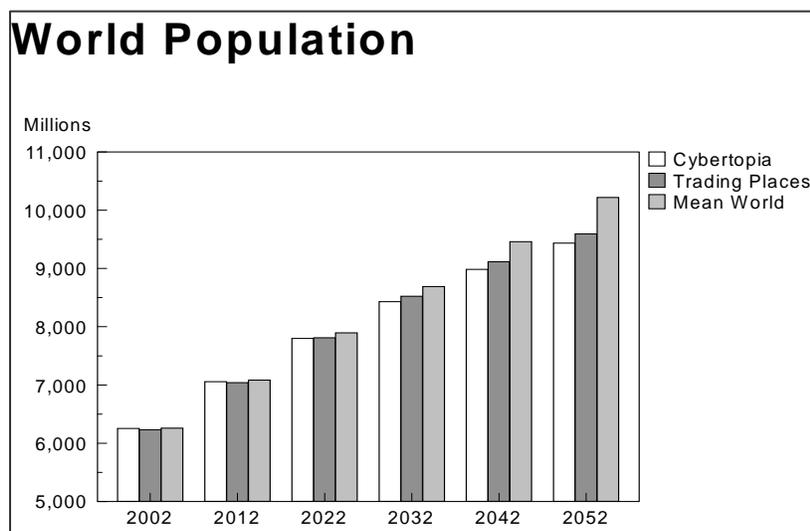
Nevertheless, global security threats were relatively low. Certainly there was awareness of the danger to national security resulting from environmental degradation (149-B), but, in general, ideologies were replaced by the desire to cash in, and no major regional tensions are apparent. Even the Middle East was uncharacteristically stable, allowing for healthy petroleum supplies at

prices that rise only modestly, in pace with inflation. The most significant military threat for the new Asian security system was the occasional flare-up of domestic turmoil in countries that have been left behind the economic wave. Religious and ethnic wars remained a hypothetical - and some cases a real - problem (23, 33-A) but no issues grew to alarming proportions. China had on occasion been forced to send peacekeepers to "the three B's" (Bangladesh, Burma, and Bhutan) when civil unrest threatened to interfere in regional trade flows.

By 2050, the transformation was complete. The U.S. and European economies had rebounded from their downturns and, though hardly robust, were getting by. Consumers, however, exhibited a weary resignation to the extraordinary changes that had taken place in the global economy, and a sense of missed opportunities was pervasive. Like the UK before it, there was a feeling of "empire lost."

The U.S. and to some extent, European, technical and research infrastructure was tiny compared to what existed in the 1990s. A record number of private universities closed, and the small percentage of middle-class high school seniors opting for college tended to favor community colleges over larger, four-year institutions. Corporate investment in R&D tended to be overseas. The US and European infrastructure was crumbling as federal and local agencies were able to afford only patchwork repairs to the road, rail, and telecommunications networks. The only bright spot: the emergence of the West as the world's most popular tourist destination for Asian vacationers. The best roads in the country could now be found in the greater Disney World vicinity, and the Orlando airport displaced New York's JFK as the initial U.S. point of entry for the majority of international travelers.

Asian governments, meanwhile, were now moving quickly to the center of global political, economic, and military power and influence. Their economies continued to develop, their military forces modernized, and they held considerable sway over the rules of international commerce.



The emerging had emerged.