"Where Are We Going?
Where Do We Want To Be?
How Do We Get There?"

Visions and Roadmaps for Sustainable Development in a Networked Knowledge Society

Report of a Workshop Co-chaired by the Presidents of the Brussels EU-Chapter of the Club of Rome and the "Factor 10 Institute"

February 2002

Information Society Technologies

European Commission

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FOREWORD

TOWARDS SUSTAINABLE DEVELOPMENT IN A GLOBAL NETWORKED SOCIETY

The EU Member States agreed in June 2001 to a common strategy for sustainable development as an integral part of the EU strategy for transition to a knowledge economy; with sustainable development at the heart of integrated policies for growth, employment, social cohesion and the environment. In addition, the agreement in July 2001 on the Kyoto protocol for reduction in greenhouse gas emissions, and the commitment of the EU Member States to ratify the protocol, now makes practical measures for resource-use reductions essential and urgent.

However, sustainability is not a question of the environment alone. Social, cultural and economic sustainability are also at stake. Incremental and separate approaches have led to improvements, but major long-term progress toward sustainability can only be achieved in a systemic approach. However, too little is yet known about the systemic relationships between the different dimensions of sustainable development; about the dynamics of a service-oriented networked knowledge society and its relationship to sustainable development. A much larger and sustained research effort is needed to underpin policies for approaching sustainability with scientific data and information.

To stimulate this research, and to help translate national and international commitments and policy objectives into reality requires that we have a description of where we want to be in 30 years - we need a "target scenario" or a "landing place". We must then focus our attention on ways and means for getting there and the role of Europe in the process.

As a first step, a small "Working Group" of key experts and research leaders was convened by the European Commission Information Society DG to discuss "landing places" for 2030; possible roadmaps for their realisation, and the necessary research. The Workshop was co-chaired by the Presidents of the Brussels-EU Chapter of the **Club of Rome: Prof. Raoul Weiler,** and **the Factor 10 Institute: Prof. Friedrich Schmidt-Bleek.**

This report draws on the papers presented at the meeting and subsequently refined and expanded, together with a number of individual contributions from the participants. Participants and contributors are listed in Annex I. This report is distributed as a contribution to the ongoing development of ideas, notably in further development of research roadmaps and in preparation of the World Summit on Sustainable Development in September 2002.

The views expressed are those of the contributors, and do not necessarily reflect the views and positions of the European Commission.

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1. A HOLISTIC APPROACH TO DEVELOPMENT

The concept of sustainable development has been primarily derived from the concern about the ability of the world's ecological system to support the growing world population and growing use of resources. The current pace and direction of industrial and economic growth cannot be sustained without addressing poverty and environmental degradation. Today, the wealthiest 20% of the world's population consume 80% of the natural resources while half of all people live in poverty. Technological development and economic growth have widened the gap between the rich and the poor and increased inequity among people, nations and regions.

1.1. Cultural Sustainability as a Fourth Dimension

Rapidly growing resource consumption, social tensions, economic migration and terrorism inflict an increasing economic and environmental burden on world society. The costs of measures to protect societies will continue to grow if inequalities and tensions increase. The long-term solution must lie in solidarity and tolerance of cultural differences and in a new partnership for development around the world. Therefore, a fourth dimension to sustainable development is considered in this report: culture.

Human cultures are characterised by a tremendous diversity, reflecting the richness of human activity. Each culture is the carrier of another vision of the world, through the variety of habits, languages, arts and specific knowledge. A multi-cultural world society has to be based on mutual respect, tolerance and the recognition of differences in practice of value systems. However, culture is also the most vulnerable in the interplay with the other dimensions of sustainability. It therefore needs specific recognition, and separate consideration of objectives and roadmaps. These are addressed in Section 3.

1.2. The New Opportunities of the Knowledge Society

The rapid emergence of information technologies, and particularly of fast and cheap global communications, notably of the Internet in the 1990s, has considerably widened the scope for change The society of the future will strongly be fashioned by the emergence of the information and communication technologies and by the emergence of a networked knowledge world society.

These technologies now offer an opportunity to empower and integrate billions of people, even in the poorest countries, and through this, to spread prosperity and education more widely than ever before. The combination of "know-how" and "know-why" can break the vicious circle of poverty and waste in the midst of plenty. In addition, these technologies offer a development route to a networked, communicating global society in which economic value and creativity is focused on immaterial service provision, rather than on the industrial production of material goods. They offer new ways to satisfy needs for access to education, health-care, markets and innovation; not as alternatives to traditional ways, but as a complement which can allow skills and resources to be used much more efficiently, when and where needed.

These technologies therefore offer different paths of economic and social development: one on which poor countries can move faster to a better quality-of-life without the

enormous investments and environmental damage of centralised industrialisation ; and one in which the industrialised countries can continue to increase their quality-of-life while reducing their resource use and environmental impacts.

This opportunity has arisen through innovation – both in technology development and its use. We are only still at the beginning of this change to a « networked knowledge society », and part of our challenge is therefore to channel the momentum of change. As the opportunities for sustainable development in this new environment become clearer, we will no doubt see better how to optimise technology developments for everyone's benefit. Each of the following sections therefore highlights the link to information and communication technology developments.

1.3. The Need for a Holistic Approach

The industrial development of the last two centuries was made possible by the availability of apparently unlimited resources and of financial capital. However, the growing complexity of the modern society has made it clear that additional forms of capital have to be given greater attention: natural capital, social and human capital as well as cultural capital.

Growth of economic activity is necessary to enhance welfare and reduce inequalities, but has to be compatible with the planetary ecological system. Energy, fresh water, land and resource use has to take account of long-term ecological damage and climate change. Ecological rucksacks and footprints of industrial activity, wherever on the planet they occur, have to be reduced dramatically. Extension of the consumption patterns of the developed countries to the actual world population -6 billion- would require more than two planets. Growth must be oriented to the fulfilment of fundamental aspirations of people throughout the world, instead of to those of a few percent of the world population as now. Maximising returns to financial capital through globalisation of the economy is a too narrow a goal for a sustainable world society.

As our societies become more complex and interdependent, all dimensions of sustainable development are pursued together. Separate step-by-step improvements in protection of the environment and in efficiency of the production processes have not led to an overall sustainable society. While each dimension of sustainability has specific properties and methodologies, they are all profoundly interlinked. Each can, to a certain extent, be described by its own sets of indicators, allowing the measurement of progress. However, this predominantly reductionist approach has not led to the desired objective. There is a pressing need for a more holistic approach, that deals systematically with each dimension and with their interactions.

The holistic approach requires the creation and definition of a value matrix reflecting the aspirations of individuals and groups in the four dimensions of a sustainable society. This value matrix has to provide guidance and inspiration to political leaders, captains of industry and business, local leaders in the civil society for the fulfilment of these aspirations.

The following sections still focus on the four different dimensions of sustainable development, but each highlights the strong linkages between them. For example, the strong linkage between reducing inequalities and future growth; between access to

education and knowledge and new technologies; between education and culture; between resource use and market frameworks; and between economic sustainability and demographic change.

In a holistic perspective, the new "global deal" in Johannesburg must not be a "trade-off" between prosperity, equity and the environment. It can be a partnership for sustainable development in a new framework of solidarity and cultural diversity, based on continued technology development and innovation, with benefits for all. The "global deal" must bind the four dimensions of sustainable development together in a coherent framework. Sustainable development must also be positioned in the mainstream of present growth-oriented economic thinking, but with the right sort of growth within a new framework in which market forces maximise prosperity and quality-of-life for all people.

2. THE SOCIAL DIMENSION

Summary

Social sustainability can only be achieved by increasing social equity and reducing poverty, world-wide. For this, sufficiently high levels of growth over the next three to five decades will be needed: near 3% per year in developed countries, and about 8% per year in most of the developing world.

Europe provides a societal model for a ***global socio-ecological market economy*** *which could be based on global contracts for partnership and co-financing in development between "North" and "South" in order to secure social, cultural and environmental capital. This will require a* ***coherent global governance system,*** *i.e. a global partnership between international governmental institutions (WTO, ILO, UNEP, UNESCO, others), Civil Society institutions, and business.*

Information and Communication technologies are doubly essential *to this strategy: for fostering enterpreneurship and providing access to world markets even in the poorest communities, without which the faster growth in the "South" will be impossible; and for a higher eco-efficiency of new growth.*

2.1. Why the Social Dimension?

Social equity and solidarity with future generations was the key principle of the original definition of sustainable development by the Brundtland Commission. In the 1990s, this solidarity was primarily seen in relation to preservation of our natural environment and resources. However, our more direct responsibility for social equity both to present and future generations has become more pressing.

Social sustainability has rightly risen to the top of the agenda in international debate. It concerns investment in social capital; in education, training and « trusted relationships », and most notably now in reducing poverty, the debt-burden of the world's poorest countries, and inequality in incomes. This will require a new "ethics of solidarity" as part of a global deal at the World Summit on Sustainable Development.

Any foreseeable global policy for sustainable development must allow further economic growth and increase in the "quality of life" in the North and a faster growth for the South. At the same time, our social, cultural and ecological capital has to be preserved. This can only be possible if much higher eco-efficiency can be achieved in economic development. Increases in production-side eco-efficiency are easier to achieve (because they are a natural consequence of technological progress and of the desire to cut production costs) than in consumption-side eco-efficiency. If we continue to focus only on production, still more resources will be used in increasing consumption (the so-called rebound effect). This effect, which is particularly obvious in road transport and "private car" technologies, is the real tough issue.

To counter the consumption rebound in industrialised countries, maximum sustainable levels of use of critical resources and of pollution must be limited in global economic systems. "Externality" costs must be internalised. This requires a stronger and more

coherent global governance system, binding together today´s sectorial regimes such as WTO, IPO, IWF, ILO, Kyoto contract, etc. This can only be done in consensus among governments, civil society and the business community. And here, poorer countries will only agree if they have a roadmap to a fair share of wealth in the future.

It is here that social equity enters strongly into any contract for sustainability. Only a fair share of resources, development opportunities for all and a perspective for global equity can open the door for global contracts of restraint within ecologically sound limits. Here, a partnership in co-financing of development (in particular, for sound nutrition, governance, health-care, education, etc.) is the crucial step. However, we now have a regional model that works: The enlargement of the EU, including the acceptance of high standards by newcomers and the co-funding of development to these high standards (structural funds, funds for cohesion, opening of markets, etc.), is a good example of the global model we need. This is an environmental and social market model. It is more than opening markets. It is co-financing for development to a common high level of prosperity and sustainability.

The EU approach may not be immediately transferable to the global dimension, but it tells us which global equity structures and parameters to look for. The EU definition of an unacceptable poverty threshold sets an equity level target (‘average income of the poorest half of the population’ : ‘average income of the total population’) of at least 1:2. We are very far from this at the global level.

2.2. The Importance of Information Society Technologies for Social Sustainability

While these issues all appear to be purely social and political in nature, there is nevertheless a very strong linkage to the rapid development of information and communication technologies, and to the transition towards a networked global knowledge economy. Social sustainability and the overcoming the “Digital Divide” are inseparable issues.

The “Digital Divide” cannot be separated from inequalities in wealth, income and education. Recent analyses, notably by Richard Wade at LSE[1] support the concerns that global income inequalities are worsening. This is one of the concerns behind public anxiety about the current phase of globalisation. And already the picture of yesterday was unacceptable and brings a high risk of conflict and terrorism.

There is in fact good reason to fear that the superposition of a service-based knowledge economy on industrial and agriculture-based economies will increase earning differentials. These inequalities risk to increase both between countries and within them.

It is clear that current inequalities have their origins in the industrial revolution, and in its narrow and uneven geographic spread, and in the narrow focus of the global economic system, which promotes free trade but does **not** deal with its social, cultural and ecological consequences. Inequalities have worsened in the last 2-3 decades. The analysis of World Bank data[2] indicates that even in the 5 years from 1993 to 1998, the

[1] The Economist, April 28th 2001

[2] By Yuri Dikhanov and Michael Ward: 2001

share of income of the poorest 10% in the world fell by 25%, while that of the richest 10% rose by 8%. The current WTO-driven economic globalisation process does stimulate development and growth and can ultimately increase global equity. However, in the current frameworks it reduces equity between the countries of the North and the South; and it threatens the global ecological system.

In the late 1990s, the rapid and geographically-uneven growth of the networked knowledge economy contributed to this worsening trend, to its visibility and to its social consequences. Faster growth in the OECD countries pulled the top 10% away from median incomes. Wider penetration and equalisation of prices for consumer goods through the growth of world trade and the transparency of world markets made income comparisons at market exchange rates rather than at "Purchasing-Power Parity" more pertinent to many people – on the basis of which inequalities are greater.

In addition, the visibility of disparities is increased through world-wide access to television and the Internet – through which many frustrated young people see the huge difference between lifestyles of the US and Europe and their own, with migration to these wealthy regions as their only alternative to continued poverty. As a consequence of globalisation, people more and more see their position relative to the developed world, no longer simply in their own country. This is a major cause of the anti-globalisation movement, a source of conflict in the cultural area, and a breeding ground of opposition and terrorism.

Against these concerns, there are nevertheless reasons for optimism:

- The growing disparities in income are more the result of exclusion from global markets than of polarising effects within them. The greatest inequalities are between countries rather than within them. The equity-imbalance parameter, which is essentially the ratio of the poorest incomes to the average income varies from 1:1.5 (65%) to 1:2 (50%) in Europe, to 1:2.1 (47%) in the US, to about 1:3.6 (27%) in South Africa and Brazil. However, the global equity-imbalance value is significantly smaller than 1:4 (25%), i.e. we live in a state of global apartheid. The devastating effect of trade sanctions in recent years well illustrate the dangers of economic isolation. Greater integration of more people (and countries) into world trade can therefore be one of the most effective measures against growing inequality, and the decision at Doha in November 2001 to launch a further round of trade liberalisation must be welcomed.

- A key "enabler" is that adult literacy has increased from less than 50% of the world's population in 1970 to about 75% in 2000. In addition, and possibly as a result, average incomes in developing countries have almost doubled in real terms (PPP) between 1975 and 1998[3].

With these two positive trends, new IT and telecommunications infrastructures are more affordable and of wider social and economic use than almost any other comparable infrastructure, whether of roads, railways or electricity supply. With continued progress in mass-produced micro-electronics and wireless technologies, 2.5 to 3 billion people

[3] From $1300 to 2500$ at 1985 PPP-US: UNDP Human development report 2001: www.undp.org

could have access to global networks by 2010 (nearly half the world's population), compared with 750 million fixed-line telephone subscribers in 2000.

The transition to a knowledge economy is likely to enable more people to actively participate in creative work activities than in an industrial economy, but the prosperity difference between those that do, and those that are excluded will be greater. Therefore, the spread of technology has to be accompanied by a more balanced framework for partnership in development, with strict limits on resource use and pollution, together with co-financing agreements between North and South.

A knowledge society infrastructure cannot substitute for other infrastructures and services, but it can provide an opportunity for local enterpreneurship and wealth-creation, without which the other services could never be affordable or sustainable.

The recent UN Human Development Report has certainly supported this more optimistic view. It has highlighted the Internet as a "critical technology", and has focused on the new IT and Communications technologies as a tool for growth and development, not just as consumer products for the prosperous. To put it more clearly: we will go forward with this technology or not at all. However, how to proceed is the crucial issue. Some ways in which ICTs can be an enabler of development are also set out in the final report of the "Digital Opportunity Initiative"[4].

The G8 "Digital Opportunity Task Force" has recognised that the "Digital Divide" threatens to worsen inequalities between countries and communities, but it also highlights the "poverty reducing" and empowering potential of these new technologies[5]. It concludes that ICTs offer enormous opportunities to narrow social and economic inequalities and to support sustainable local wealth creation. It highlights how they can enable communities to collect and share knowledge; produce more efficiently; access new markets, and improve government services.

The overwhelming current consensus is therefore that development policies must accelerate and widen the deployment of electronic communications infrastructures, with universal and affordable access, and must stimulate both the enterpreneurial and social use of them. However, this faster deployment of enabling infrastructures must be part of a partnership for co-financing development, within a more balanced framework for economic development.

2.3. Landing Place 2030 and Recommendations

With this background, a possible and credible overall target could be to reduce income inequalities between countries by 2030 through global contracts, more co-financing, including through widening opportunities for entrepreneurship and participation in work, together with a balanced liberalisation of world trade in services and new local investment facilities.

[4] Creating a development dynamic: Final report of the Digital Opportunity Initiative, July 2001: UNDP, Accenture and the Markle Foundation, with the collaboration of the ITU, OECD and UNESCO.

[5] Digital Opportunities for all: Meeting the challenge. Report of the G8 Digital Opportunity Task Force – 11th May 2001

This could be part of a broader strategy for the next 30-50 years. A strategy to increase the world gross national product by a factor of 10 while simultaneously limiting critical resource uses to today´s level within a world contract for sustainability. Such a strategy depends on sustained growth, with average world growth rates of 4 to 5% over a 50-year period: a level similar to that achieved in recent years.

However, the distribution of new growth between North and South of the wealth created must be asymmetric. While the 20% of people in developed countries currently create and consume 80% of today´s wealth, in 2030 their share could be nearer 40%. This corresponds to average growth rates of almost 3% p.a. for the North sufficient to sustain high levels of employment, and 7-8% p.a. for the South, sufficient to substantially reduce poverty and inequality. And by 2050, the global equity level could be nearer that of the European social situation today. These growth rates are only achievable and sustainable in the North and South through an accelerated and determined transition to a networked knowledge society, with ICTs empowering entrepreneurship and trade in all communities.

Intermediate targets could be:

- Continued progress in education to raise adult literacy rates above 90% by 2030, including « digital literacy » (ability to use ICT-based communications and info systems).

- Access to data communications networks in over 90% of communities by 2030 (including shared access facilities) together with adult training, support for entrepreneurship and e-work. An interim target of 2 billion network users by 2010, including shared use in 50% of communities worldwide, is possible.

- Market and regulatory conditions (including radio spectrum availability) to ensure wide dissemination of network access at affordable prices and adaptation to local needs; and to encourage innovation and local entrepreneurship. This does not necessarily require universal service obligations on major telecoms – it may be possible through facilitation of local “radio access and WAN entrepreneurs”.

- Development of appropriate and affordable networking and interface technologies which are simple to use, and reflect cultural and linguistic differences.

- Facilitation and encouragement of networking of business services between developed and developing countries; at the same time, encouraging the wider dissemination of best employment practices (networked e-work collaboration and e-migration).

- Encouragement for « triple-bottom line » reporting, including in social and human capital development, by all publicity-quoted companies (worldwide) by 2010, with fiscal incentives for social and human capital development.

- Building on networks for change and promoting new forms of partnership and governance involving governments, global companies and the world civil society, notably NGOs. Again, ICT plays a crucial role for co-ordination between and within these three actors.

3. THE CULTURAL DIMENSION

Summary

To avoid a catastrophic "clash of civilisations" in a multi-cultural world, cultural sustainability has to become a priority, taking into account two distinctive elements: Cultural identity and diversity as a legitimate goal in itself; and respect for fundamental human rights. Culture is crucially important to overall sustainability because of the need to find a shared base of beliefs and goals for a global governance system with the power to conceive, implement and enforce sustainability policies on a global scale.

The European Union is one model. It involves a multitude of different but co-operating cultures, turning the threat of cultural divisiveness into the asset of cultural diversity. However, global cultural sustainability will be possible only on the basis of global dialogue and cultural interaction. In this, communications technologies play an increasingly important role: The emerging global networked knowledge society will be central to shaping a global culture of co-operation.

3.1. Why Cultural Diversity is Important to Sustainable Development

If we have learned one thing from nature, it is that loss of diversity increases environmental instability. In light of the terrorist attacks on New York City and Washington, D.C., it is high time we recognised that the same is true for culture: Loss of cultural diversity increases political - and economic - instability. If the goal is sustainable development, then multiple cultures, like multiple species, must be preserved and nurtured.

For some time, globalisation, pursued largely by multinational corporations, has been widely perceived to favour the haves, while marginalizing the have-nots. The developing world increasingly finds their values, beliefs and cultures at best ignored and at worst besieged by the homogenising effect of globalisation. Via trade, television and the Internet, an alien Western culture overwhelms local cultures - threatening human identity, both individual and collective.

The tensions between the Western and the other cultures, as highlighted by the terrorist attacks on New York City and Washington, D.C., evidence the growing uneasiness with a perceived dominance of Western culture. This results not only in a conscious turning away from Western influences in a growing number of countries, and a revival of traditional values in these societies, but generates acts of violence against any representations of this culture, be they material or human. Even before September 11, 2001, globalisation was producing a striking backlash in the developed world itself - at multilateral meetings in Seattle, Washington, D.C., and Genoa. Indeed, a one-size-fits-all mono-culture - variously confused with globalisation, capitalism and America - seems to be partly to blame. Alarmed that such alienation has engendered terrorism, a fourth 'cultural' dimension of sustainable development is essential[6].

[6] "I am convinced that cultural diversity is crucial for world stability," said UNEP chief Klaus Toepfer at a UN meeting in New York City last fall, asking for dialogue on the subject at the World Summit on Sustainable Development next year.

The debate about how to ensure cultural sustainability has to be a two-tiered one that must take account of the two distinctive elements: Cultural identity and diversity is a legitimate goal in itself; and is inseparable from the respect for fundamental human rights[7]. The strive to protect cultural identity and cultural diversity is itself subject to a higher set of values. Cultural diversity implies not just the recognition of differences, but equally the existence of a common set of values, such as the respect for human life and human dignity, freedom of religion, freedom of information, and the right actively to participate in one's own culture. As long we can identify with a common set of human values, different cultures can co-exist and engage in a peaceful exchange of ideas, products and services. Such exchange in turn fosters learning about other cultures.

3.2. The New Challenges of the Networked Society

Communications technologies play an increasingly important role. Access to information of all kind, anywhere and at any time, over television and the Internet is a new phenomenon in society. Today, nobody will deny the immense impact of networking on the music creation scene, e.g. through Napster.

Until recently the cultural sphere was separate from the economic or production spheres. In the 1980s, we began to see cultural experiences transformed into products and services.[8] In the mid-90s, entertainment became the fastest growing industry in the United States, with an annual turnover of over $480 billion. Today, all consumer industries use marketing techniques that sell lifestyles with their products and services. Advertisers imply choices reflecting value judgements: Soap bought in “The Body Shop” is a statement about environmental protection, McDonalds and Nike let you participate in the American way of life. Cultural production is the medium for Americanisation of the World[9], and threatens cultural diversity. Homogenisation of lifestyles, tastes, and behaviours increases the return on investment for global products - economies of scale and scope inherent in network economies favour media concentration; and economies of content production favour content directed at mass markets to the detriment of minority cultures and quality[10];

The **Council of Europe** has recently agreed that: "Sustainable development as defined in relation to cultural diversity, assumes that technological and other developments, which occur to meet the needs of the present, will not compromise the ability of future generations to meet their needs with respect to the production, provision and exchange of culturally diverse services, products and practices.[11] A set of values comprising

[7] “The defence of cultural diversity is inseparable from respect for human dignity. It implies a commitment to human rights and fundamental freedoms, in particular the rights of persons belonging to minorities and that of indigenous peoples. No one may invoke cultural diversity to infringe upon human rights and fundamental freedoms". Draft UNESCO Declaration on Cultural Diversity, August 2001.

[8] The "McWorld" looks like a uniform and homogeneous planet, and the symbols of modern society are brand names of popular American (Western) culture”: Jeremy Rifkin, Access - Das Verschwinden des Eigentums, Frankfurt/New York, 2000, page 215.

[9] "Images of America penetrate this global village so deeply that it almost seems as if not the world immigrated to America, but that America emigrated to the world”. Kim Campbell, the former Canadian Prime Minister

[10] European Parliament, Directorate General for Research (STOA), Cultural Diversity and the Information Society - Policy Options and Technological Issues, Final Study, July 2001.

[11]"Cultural diversity has always been a fundamental political objective in the process of European construction, and it assumes particular importance in the building of an information and knowledge based society in the 21st Century." :

solidarity, a caring stewardship of material resources and a willingness to resolve issues co-operatively through discourse have become pillars of a "European Cultural Commons".

3.3. Landing Place 2030 and Recommendations

To define the policies for cultural sustainability, we need consensus on how our world could look in thirty years. We clearly need culturally diverse and vibrant societies in which individuals have the opportunity actively to participate and to pursue and fulfil their need for a sense of identity and a sense of belonging. We want a world in which different cultures peacefully co-exist, in which cultural exchange is based on the principle of equality - a "landing place" in which a spectrum of civilisations[12] is embedded in a spectrum of cultures[13], One of **"learning communities"** [14] in which no culture imposes its values on others, and where "learning from each other" is a value in itself.

Although various scenarios can be envisaged[15,16], none really describe a "landing place". Unlike in the environmental or in the social sector, cultural diversity does not lend itself to a description of a "landing place" in purely scientific terms. Cultural sustainability deals with human creativity and experience, and is thus more difficult to measure. Nevertheless, indicators of change are needed, and these same indicators must enable us to describe the future goal.

The present list of indicators is only a preliminary one. Research is needed on the viability of each and on whether others are needed. The list is in two parts:

Diversity and identity

- Languages[17]; *Goal*: to maintain the diversity of languages actively spoken today.
- Cultural products and services (books, music, audio-visual production) produced at a local, regional and national level; *Goal*: To increase indigenous cultural production.
- People employed in cultural activities; *Goal*: To increase cultural employment.
- Web-sites in different languages, and diversity and range of subject matters covered by these web-sites; *Goal*: To broaden the diversity of content available world-wide.

Council of Europe, Declaration on Cultural Diversity, adopted by the Committee of Ministers at the 733rd meeting on December 7, 2000.

[12] The system of rules and technologies of a society at a fixed point in time.

[13] The collective behaviour, values, orientation patterns, and processes of perception: For an individual it answers questions like: How can I live meaningfully? What is beautiful? How can I achieve recognition?

[14] Wolf Lepenies, Anmerkungen zur auswärtigen Bildungspolitik, Bildungsforum der Berliner Universitäten, 5. November 1997.

[15] For example, ones from the "**Alliance for a Sustainable Information Society**" developed by the Institute for Prospective Technological Studies, Seville.

[16] A European Way for the Information Society, Third Annual Report of the Information Society Forum, Brussels 2000. This explicitly acknowledges the cultural dimension, and recognises that ICT has the potential to enable distinct cultures to co-evolve, enriched by truly global communication between their members. However, only in the right policy and market frameworks, informed by the widest possible **global society dialogue.** See in particular Chapters 4, 7 and 8.

[17] Today, about 5, 100 languages are spoken. Many observations suggest that within a generation or two, only a few hundred will survive. With their disappearance, entire cultures will vanish.

- Cultural material freely available; *Goal*: Affordable access to quality content for all;
- Independent producers of cultural products and services; *Goal:* To increase the independent production base[18].

Peaceful cultural exchange

- Second and third languages; *Goal*: Everyone should learn at least two foreign languages to engage in cultural exchange.
- Cross-border exchange of cultural products and services; *Goal*: Increase overall export of cultural products and services, in particular from countries with a negative balance of trade in this sector.
- Students studying at foreign universities; *Goal:* Increase number of students studying abroad, with a view also to better balance the flows of students from the Western to the developing world.
- Cross-border cultural exchange programmes; *Goal*: Increase number and range of such programmes.
- International youth exchange programmes; *Goal:* Increase number of young people participating and range of countries covered.
- NGOs dealing with cultural sustainability; *Goal*: Increase international awareness.

There must also be **linkage indicators** dealing with knowledge transfer, such as literacy, or learning communities, which measure social and cultural sustainability.

These indicate that we need to widen our approach in Europe if we want to achieve a truly sustainable information and knowledge society. We must carry out the necessary research to set the goals and understand how to reach the goals: to identify the procedural, institutional, legal and behavioural changes needed in society, and the new forms of governance that would provide some chance of achieving our aspirations. This is outside the scope of conventional social scientific research and will require an avant-garde approach.

It is also urgent to address the challenges to cultural diversity. Technological and market developments accelerate rapidly, changing the framework conditions for cultural diversity quickly and dramatically. Cultures, including languages, once they have ceased to exist, cannot be reanimated. In particular, the specificity of cultural services within the trade policy context needs to be better defined during the current Doha-round negotiations, i.e. within the next 2-3 years.

Over and above such rapid trends, which require our attention urgently, there are much slower but powerful cultural developments that need to be addressed as well, foremost the so-called paradigm shifts.[19,20].

The Treaty on European Union defines the relationship between cultural policies and other legitimate policy objectives. The diversity of European cultures must be taken into

[18] Strong cultural industries encouraging linguistic and artistic expression have a positive impact on pluralism, innovation, competitiveness and employment. They have a crucial role to play in a culturally diverse knowledge society.

[19] Marc Luyckx Ghisi, Au-delà de la Modernité, du Patriarchat et du Capitalisme - La Société réenchantée?, 2001.

[20] Mircea Malitza, Ten Thousand Cultures, One Single Civilisation: Toward Geomodernity of the XXI Century, 1998.

account in all policies. European cultural programmes[21] are an expression of this approach. In addition, Europe now needs to develop a clear and verifiable policy which sees cultural diversity as an asset and cultural literacy as a main vehicle for sustainable development. Such a policy would help Europe's citizens respond positively to globalisation and immigration. In addition, it could be an example to other regions.

In the global context, no safeguards protect cultural differences against conflicting interests. The WTO rules have the sole objective to facilitate free trade. The General Agreement on Trade in Services covers cultural activities, and subjects them to the same principles of trade liberalisation and economic efficiency as any other services. However, cultural services, like environmental "services", have a broader social function. If sustainable development can be seen to have a legitimate cultural dimension, we must develop a global framework that recognises this fact and puts the goal of cultural diversity on a par with economic growth, social equity and environmental health. Presently, UNESCO instruments only enjoy the character of political appeals. The United Nations should itself deal with cultural sustainability as part of a holistic policy for sustainable development.

[21] Such as SOCRATES, Culture 2000, and the European Year of Languages 2001, as well as programmes fostering European audio-visual production, quality programmes and media pluralism

4. THE ENVIRONMENT AND RESOURCE USE DIMENSION

Summary

The natural capital of the environment and of natural resources is more threatened than ever by continued population and economic growth. However, in the 30 years since the publication of "Limits to growth", the concerns have changed: We are not exhausting mineral resources and fossil fuels, but the impact of their use on the environment is becoming critical. Economic growth is still tightly linked to growth in resource use, and now contributes more to increased pressures than population growth itself.

Nevertheless the emergence of a global networked knowledge society opens new opportunities for improvements in resource-use efficiency, yet enabling fulfilling lifestyles as we continue to reduce toxic anthropogenic material cycles and separate them from natural cycles. The application of information and communication technology is vital to the development of environmentally sustainable production, logistics, consumption, and for the emergence of a mosaic of environmentally sustainable lifestyles. Without a rapid availability of these technologies to the vast majority of all people in the networked knowledge society, environmental sustainability will not be possible. However, neither will an accelerated transition to the knowledge society automatically lead to sustainability. The environmental challenge is ultimately a cultural one: to find a common denominator of commitment in different world cultures conducive to overall environmental sustainability, and to use this common denominator as the basis for a global partnership.

4.1. Why the Natural Environment and Resource Use are Critical

The pressing need in the South for a better quality of life can only be achieved if economic growth of 7-9% p.a. can be sustained for some decades, at the same time as the North continues to grow at about 3% p.a. In the current models of industrial production and material consumption, this will increase resource use beyond environmentally sustainable levels[22] and will undermine the capacity of the biosphere to absorb the rising levels of waste and pollution. In absolute and in per-capita terms, resource use for production and consumption must become much more efficient; we must shift towards the use of renewable resources rather than mining the capital, and towards cycles of production and consumption in which wastes are re-used as resources. We must make the transition to de-materialisation of production and distribution of goods and services ("Factor 10/4")[23], and to the immaterialisation of lifestyles through a "shift from material goods to services"[24].

Dematerialisation can only be achieved by significant improvements the of the added-value per unit of resource used (energy, land, materials, etc.). On average, resource-use

[22] Global environmental outlook 2000, UNEP; The state of world fisheries and aquaculture, FAO, 2000

[23] Carnoules Declaration 1994 and Carnoules Statement 1997 by the Factor 10 Club, www.factor10-institute.org, "Wieviel Umwelt braucht der Mensch, MIPS das Mass fuer oekologisches Wirtschaften", F. Schmidt-Bleek, 1993, available in English under the title "The Fossil Makers" in www.factor10-institute.org. Ernst Von Weizsaecker et al. 1996.

[24] Digital futures: www.forumforthefuture.org.uk

efficiencies will need to increase at least as fast as the economy grows in order to keep man's global resource use at or under current levels, particularly for toxic or cancerogenic materials and chemicals which affect natural balances in eco-systems, but also for water, land, concrete and metals.

4.2. The Importance of Information and Communication Technologies

A growth-based strategy for environmental sustainability can only be achieved by further stimulating technology developments and innovation. Information and communication technologies (ICTs) have a special role to play in this, as highlighted in the recent UNDP, G8 and Digital Opportunities reports[25]. ICT development and innovative use is therefore doubly essential to a "Global Deal" – as a decoupler of resource use and growth and as an enabler of an environmentally sustainable mix of lifestyles in the global networked knowledge economy.

These technologies enable higher value to be associated with all goods and services; they can allow some material goods to be replaced by on-line services; they can enable better logistics in business supply-chains and transport; and they can enable structural change in the way work and business is organised[26,27,28].

In contrast to "clean" or "environmental" technologies that by and large allow only marginal improvements in current industrial processes, ICT can lead to major improvements in resource-use efficiencies through structural change (e.g. better use of existing infrastructures such as office buildings and transport, improvement of the logistics and management of large-scale operations, dematerialisation of lifestyles through mass communication). A similar impact on environmental sustainability in the longer term may be expected from biotechnologies, and from their convergence with ICT.

4.3. Landing Places for 2030 and the Roadmap to Them

By 2030, it should be possible to secure healthy diets for all, with agriculture shifted toward a more sustainable balance between proteins from animals, plants, fungi, algae and bacteria; and with much more efficient use of the synergies between these five types of species[29]. Drinking water supply and quality should have substantially improved: through much better management of supplies; through less pollution, notably from more careful and efficient use of chemical fertilisers, pesticides and insecticides.

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[25] Creating a development dynamic: Final report of the Digital Opportunity Initiative, July 2001: UNDP, Accenture and the Markle Foundation, with the collaboration of the ITU, OECD and UNESCO. And the report on Digital Opportunities for all: Meeting the challenge. Report of the G8 Digital Opportunity Task Force – 11th May 2001

[26] Case Studies of the Information Society and Sustainable Development: Lennart Forseback 2000; Published by DG-Information Society; European Commission.

[27] The Knowledge Economy and Climate Change: Lennart Forseback 2001; Published by DG-Information Society, European Commission.

[28] UK Institute of Civil Engineers -"Consumption of energy in the construction, operation, renovation and demolition of buildings accounts for half of UK energy use, and is an area in which technological developments and professional expertise can make a major contribution to addressing environmental concerns."

[29] Gunter Pauli, personal communication, January 2002

Most people should be living in sustainable cities, and therefore enjoy better health, access to education, services and social exchanges, much of this made accessible through the network. In addition to focussing on land use and its impact on bio-diversity and on the 'stored resources' in buildings we need to look much more closely at how buildings and cities are used[30]. How can they be used more efficiently AND more effectively to reduce resource consumption as well as improve the overall quality of the environment and the quality of life of their inhabitants.

We must consider a broader set of issues than just how to develop more energy-efficient and environmentally comfortable new office buildings and houses. Re-use of existing buildings needs to be considered alongside planning and urban issues. The new building stock needs to be designed for a less car-dependent society rather than the existing fabric. New construction must be planned and designed to encourage less travel, especially in motorized vehicles. In order to do this, land use planning must attempt to halt counter-urbanism and encourage compact, mixed use, accessible development. We need to challenge the prevailing workplace accommodation paradigm – office workers are employed in dedicated office buildings, often remote from other urban and social functions. We need a redefinition of the term 'workplace' and a rethinking of many aspects of city design. In this, progress toward healthy and stimulating working conditions should be ubiquitous.

For animals and plants, as well as for ourselves, we should aspire to a safer climate with less "locking-in" of weather patterns, with CO_2 and other greenhouse gases sufficiently curbed, and with better protected habitats for endangered species and areas with a rich bio-diversity. Deforestation must be curbed, seeking to retain at least the forest levels of 2000, and we must substantially curb the pollution of rivers, lakes, oceans.

The Kyoto Protocol should be fully implemented and should be extended to cover all anthropogenic substances impacting on the climate and ocean circulation. Global institutions must be strengthened to form a governance network able to enforce sustainable use of the "Commons" (oceans, atmosphere, the Antarctic etc.).

In the business world, Corporate Social Responsibility (CSR) must become a ubiquitous requirement and strategy as part of a new culture, in which the "democratic socio-ecological market society" is the prevalent societal pattern of nations.

The challenge is how to reach these goals:

A new mindset (paradigm) needs to be promoted which calls for de-materialisation of production and im-materialisation of consumption and lifestyles, while at the same time advocating a partnership between North and South leading to sufficient growth to reduce inequalities and to generate the human and financial resources necessary for innovation. The potential of information and communication technologies for achieving much less material-intensive lifestyles has not yet received enough attention in the political and public debate.

[30] GSA-USA -"Buildings are where Americans spend about 90 percent of their time. They use 1/3rd of total energy and 2/3rds of electricity. Their construction consumes 1/4 of all harvested wood and 3 billion tons of raw materials per year. Buildings consume 17% of water and 50% of CFCs. They also produce, directly or indirectly, 33% of CO_2 and 40% of landfill waste."

Greater attention needs to be given to the mainstream development of ICT, compared with "clean" or "environmental" technologies, and also to the convergence of biotechnologies with information technology. These two research areas are key innovation drivers for environmental sustainability.

In addition, the level of knowledge on the "impact triangle" between growth, equity, and sustainability is very low. It must be therefore be subjected to systemic research into the causes of unsustainable development. More specifically, the consistency of the environmental sustainability policy recommendations with the other 3 sustainability dimensions and with economic and social policy must be analysed. This is tantamount to asking for overall systems sustainability research as a new discipline "sui generis", perhaps under the name of "policy impact assessment".

Existing environmental policies (on national, EU or world level) should include stronger support for de-materialisation: e.g. by using new ways of organising work and lifestyles to reduce travel, and to improve the quality of life through access to immaterial services, notably for education, health-care, government services and social interaction. We should encourage the substitution of material goods consumption through the consumption of immaterial services, for example, by a shift of taxation from "innovation" or added value, to taxation on the use of material resources, energy, land and transport facilities.

For this the "framework conditions" for trade and markets must change, at national and global levels. We must create frameworks which support "green entrepreneurship" and corporate social responsibility; which support a global dialogue on environmental sustainability and encourage cultural exchange on environmentally sustainable lifestyles; which can help identify opportunities for win-win-win solutions for growth-equity-sustainability; and which can lead to an omni-lateral global governance system, with business and NGOs as full partners of governments.

By 2030, the prevailing mindset in most global cultures should have shifted away from thinking in pure tradeoffs between environmental and socio-economic sustainability to a systemic view with a balance between tradeoffs and multiple-win approaches. The success criteria for environmental sustainability policy (efficiency, sufficiency, compatibility or "non-toxicity") will have become more universally applied to all four dimensions of sustainability policy. Of course, this can only come about to the extent that the next three decades will suffice to generate a track record of overall sustainability policy success.

In 2030, many of the environmental problems compounded during the industrial age and in the transition to the global networked knowledge society will still persist. While per capita loading of the natural environment may have improved considerably, further progress will still be needed because of the inevitable continued growth in the world population to about 8.5 billion. Of all four dimensions of sustainability, the environmental dimension will prove to be the one to keep us busy longest.

5. THE ECONOMIC DIMENSION

Summary

For good or ill, the economic system lies at the heart of sustainable development. This central role involves both economic sustainability per se and the impacts of the economic framework on other dimensions. ***For the economic system itself****, sustainable development requires stability****,*** *that governments are able to sustain the financing of social systems, notably pensions and health care through a period of rapid demographic change, and that businesses are able to sustain viability and profitability through a period of rapid technological change and globalisation. For* ***other dimensions of sustainable development****, the economic frameworks for social and economic development must also be adapted to new challenges and aspirations.*

The global networked economy – with new strong linkages through telecommunication infrastructures and their applications (e-commerce, e-working, e-finance) – presents both a tremendous potential for growth but also for chaotic volatility, thus posing a serious challenge to economic resilience. The business cycles of the past have become much more tightly linked with innovation and financial cycles, all three reinforcing each other. New ways must be found to control dominant interests; to de-couple subsystems, manage shocks and fluctuations and invest more in knowledge and skills.

5.1. Why the Economic Dimension is Central

The sustainability of the economic system *per* se must be assured as well as the contribution of the economic framework to sustainability in other spheres.

Economic sustainability *per se*[31] involves the smooth, stable functioning of the economic system, the flow of affordable and high-quality goods and services to the population, and economic activities that enhance rather than detract from individual quality of life and social inclusion. It also involves a major intergenerational responsibility, since the working population must finance the education of the young and the care of the old.

Today's world, and particularly the global networked knowledge society, is a dynamic and uncertain place. The concept of economic sustainability must include *resilience*: the system's ability to respond to shocks – either by damping them or by diffusing them into less critical paths of propagation. It involves promoting diversity and competition, isolating or decoupling subsystems, damping oscillations, and replacing positive feedback loops with mutually stabilising linkages among subsystems. Recent events have clearly demonstrated the importance of resilience in the economic sphere[32]. Above

[31] Economic sustainability in *stock* terms involves the resource base used for production. These resources may be produced or natural capital; tangible or intangible (e.g. financial or human capital); 'private goods' subject to well-defined property rights) or 'public goods' such as ecosystems and intellectual capital). Economic sustainability can also be conceived in terms of *capabilities* (including benefits and harms) – the functioning of the resource base. Here, the focus is on *substitution* among specific resources or economic activities to maintain or increase levels of capability and realise improved combinations of welfare, equity.

[32] Manuel Castells: The Internet Galaxy – Reflections on the Internet, Business, and Society. Oxford University Press. Oxford, New York 2001.

all, however, it is a *system property* – it cannot be owned, and affects us all. These are the characteristics of a public good – perhaps *the* public good of our time.

Sustainable management of public expenditures is naturally tied to demographic changes. Aging populations, increasing labour productivity and macroeconomic trends combine to reduce the proportion of economically active people and possibly tax revenues while raising demands for public and private expenditure. Managing this threat to the sustainability of public services may require a range of economic responses: gradual retirement programmes to reduce the costs of caring for the elderly whilst preserving or increasing their quality of life; using ICT to increase social inclusion and the efficiency of service delivery; rethinking pension and social security programmes to increase effectiveness while managing the consequences of recent increases in the volatility of asset values; etc.

Demands for public expenditure are also changing with demographic changes, rising aggregate prosperity, women's empowerment and other social changes. Many countries lack the economic mechanisms and infrastructure needed to address these challenging problems. The provision of adequate levels of basic public services is an issue that concerns us all. Short-run consequences of failure are magnified by the global networked knowledge society. The long-term response must involve sound, equitable and sustainable public finance (tax and expenditure) systems throughout the world.

For long-term business viability and profitability, three types of efficiency must be assured: *allocative* efficiency – whether the right mix of outputs is produced and distributed to those who value them most; *productive* efficiency – whether output is produced at least cost; and *dynamic* efficiency – whether incentives for innovation and investment are sufficient to sustain efficiency in the long term. Perfectly competitive markets can promote efficiency, but are rare. To reconcile economic efficiency with sustainability, market prices must take due account of spillovers. These may involve economic externalities or costs and benefits arising in the environmental, social or cultural spheres.

5.2. The New Challenges of the Global Networked Economy

In the global networked knowledge society more sophisticated approaches are needed to deal with increasingly complex comparisons, very different stakeholder perspectives, and the information available to individuals or groups.

The global networked knowledge economy has a tendency towards concentration of scale and scope. To counteract this, national pro-competitive policy will not suffice – the actors are global, and diversity is important. Competition provides incentives for growth and development and fair returns on investment that support long-term economic health. By contrast, concentrated industries tend to become sluggish, and convert their monopoly profits to social cost. These well-known principles are given new urgency by the emergence of the global networked economy, which also enhances possibilities for detecting and responding to failures on a global scale.

In a networked economy, the link between economic systems and equity is particularly strong. Markets determine income distributions and purchasing power; the winner-takes-all characteristics of the 'New Economy' typically increase the dispersion of wealth. A

highly inequitable economic system can discourage effort[33] and innovation[34], and envy can result in socially, politically, culturally and even environmentally costly disruption. Lessons can be taken from taxation: marginal incentives are required to induce innovation, but they should be non-discriminatory and proportionate. In any case, a modern economy cannot easily trade growth for equity.

The link with resource-use is also strong. The grow-or-die (accelerator) effect reflects the (fairly large) part of the economy that depends on growth in other parts. If this growth involves material production, the material footprint of the economy is increased and sustainability threatened. However, as the expansion of services and even the dotcom bubble show, value growth can be largely immaterial. Whether this growth is ultimately sustainable, or whether the economy can successfully make a transition analogous to the demographic transition (from exponential growth to slower balanced growth) remains to be seen.

In the global networked economy, perceived skill gaps and skill shortages reflect demand as well as supply deficiencies. The mix of skills needed for economic sustainability goes beyond ICT skills *per se*. Moreover, the increasing 'knowledge content' of daily life may increase the footprint of learning activities – these costs must be borne somehow; new technologies offer considerable potential for increasing the efficiency of knowledge capture and transfer and for exploiting complementarities between living, learning and working.

5.3. Landing Places for 2030 and the Roadmap to Them

The aspiration for 2030 in purely economic management terms can be relatively simply stated: Sufficient economic stability to enable long-term sustainable development in all countries; public financing of essential services capable of providing increased support to education for a knowledge society, and increased support for care of the old in **stable** populations. The challenge is how to get there.

Mapping aspirations to immediate policy options is not a simple matter of choosing among exclusive alternatives. Decision-making can only be improved by better understanding of the state of play, the behaviour of all players and the likely consequences of policy choice. This in turn requires a commonly agreed set of *indicators* and an adequate *understanding of the various stakeholders*: how they frame and weight different issues and their available strategic options – in brief, a 'road map' that identifies desirable destinations with guidance as to likely diversions or distractions en route and appropriate responses.

Indicators tend primarily to reflect conventional socio-economic measures related to GDP or other monetary entities: While there is a sound analytic basis for national accounts, much remains to be learned about a sustainability-orientated 'navigational

[33] Greater equity promotes social sustainability, may restrain aggregate growth and may lead to a value transformation (pace environmental Kuznets curves) but also moves greater proportions of the world population into the 'middle-class' zone where propensities to consume are high relative to those of poor people in subsistence economies or the very rich. Perhaps an inverted-U-shape graph of consumption (material consumption ?) vs. (per-capita) income might make the point.

[34] The relation between growth and equity may have the inverse U-shape of a Kuznets curve.

system' integrated with policy formation and implementation on a continuing and consistent basis. This implies a need for a roadmap that:

- considers local perspectives, even on global problems: i.e that recognises that action will continue and needs will arise at the local level - i.e. not just at world summits or international treaties;
- looks beyond poverty or other single-cause explanations (and hence cures) for sustainability problems[35];
- recognises that decisions need to be based on 'good' prices which reflect the full social opportunity costs of resource use, including scarcity, value in competing uses, externalities, and existence and bequest values placed on resources (especially common resources) over and above their use or exchange values;
- distinguishes between marginal quantities (which influence decisions) and average quantities (which determine feasibility); and that
- helps users to identify their own desirable and undesirable destinations by providing a holistic assessment framework.

Within this framework, taxation must play a dual role: financing public expenditure and providing incentives for behavioural change. There is considerable scope for tax systems to make a better contribution to the provision of public services, and to take better account of the social and environmental costs of business activities, provided these can be properly identified and evaluated. Examples such as 'ecotaxes' are already part of the EU policy landscape, and can be refined and extended to encourage socially productive activity in the public and private spheres.

However, taxes are always imposed by national and local authorities. Their use to address global problems is new. It raises the threat of a 'race to the bottom' form of tax competition, which may jeopardise both tax revenues and incentives to deal with problems of sustainability. It also raises the questions of global governance, and of the use of national taxation to protect the "Global Commons".

The economic system rests on the co-ordinated function of a variety of institutions in the private, social and public spheres. Because sustainability offers so many difficult-to-value externalities, and because the underlying dynamics are so complex, market forces alone cannot be relied upon to provide correct signals of social scarcity, to reveal impending structural changes or to generate adequate substitutes for exhaustible resources.

Traditional societies, such as those in the developing world, rarely rely on markets to allocate natural resources[36], preferring a wide range of local institutions[37] – this is often

[35] This prescription rests on such factors as: the fact that poverty both causes and is caused by environmental problems, the fact that other factors - and actors – play important roles, and the difficulty of obtaining measures that are conceptually sound and useful for policy.

[36] For example, a recent speech by Nobel Laureate Joe Stiglitz at a forum in Nigeria highlighted the role of local public institutions in managing oil resources in order to support development and fight poverty– BBC 22 January 2002

[37] By way of contrast, access to water and energy are increasingly market-mediated in Western developed economies, but treated as communal resources in sub-Saharan Africa.

cited as one reason why there is so little evidence of a "race to the bottom" in environmental standards in 'pre-market' countries. Such institutions rely on social norms rather than prices for signals and incentives, and these tend to be less responsive than markets[38], but, like them, can erode under changing circumstances.

In the developed world, so far, public policies have failed. Fiscal instruments (taxes and subsidies) have proved an especially rich source of perverse incentives. These institutional failures reflect local interests and policy priorities[39] - they certainly manifest themselves in widely different (and equally valid) views of the 'root cause' of environmental problems associated with the functioning of the world economy: population growth, demand growth, the 'wrong kind' of growth, poverty, etc.

This wealth of perspectives has spawned an equal wealth of case-by-case proposals for reform. What seems to be missing is an overall systematic perspective that uses the full rigour of its disciplines and takes due account of the interests and perspectives of the various stakeholders, developing solutions that are readily explicable, implementable, robust to the activities of other parties and consistent with the functioning of economic, socio-political, cultural and physical institutions.

The global networked knowledge society has produced a wealth of possibilities for enhancing the physical sustainability of the economic system by a variety of technological and market advances that permit us to substitute away from scarce resources. The logic of this process is clear: as resource scarcity grows, costs rise, and the economy will substitute other resources. In some areas (notably energy), this process has been very successful: not only have alternatives been found but (within limits) the social opportunity cost of energy has actually fallen in some areas. In principle, the "New Economy" will follow this logic by input substitution away from material resources and eventually by output substitution of immaterial services for physical goods. However, this assumes: first, that resource prices will reflect social opportunity costs[40] ; and second, that nearby substitutes actually exist. The first requires successful institutional performance; the second depends on continued innovation and technology development.

[38] Partha Dasgupta

[39] For example, gaps between physical and social scientists are now routinely bridged in studying on environmental sustainability from an academic point of view, but the gaps separating academics from policy makers and both from stakeholders 'on the ground' have proven much harder to bridge.

[40] This cost should reflect externalities (including environmental load) and the (expected present value) consequence of failing to develop a substitute.

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Selection of web-sites on Sustainability in the Network Society

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2. e-mobility 2001, EU Information Society Conference June 2001 http://www.e-mobility2001.org/
3. Global Business Network – www.gbn.org. See also Anders Wijkman
- www.gbn.org/public/gbnstory/network/individuals/ex_wijkman.htm
4. GLOBE (Global Legislators Organisation for a Balanced Environment) – www.globeinternational.org
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6. Institute for Sustainable Development Poland – www.ine-isd.org.pl; see also Andrzej Kassenberg – www.rec.org/Climate/Casestudies/Poland.html
7. Ashok Khosla: Beyond Public-Private Partnerships - http://www.asiasource.org/asip/khosla.cfm
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http://www.geocities.com/~acunu/millennium/Millennium_Project.html
12. The World Summit on the Information Society (Geneva 2003, Tunis 2005)
http://www.itu.int/wsis/index.html (see also International Telecommunication Union
http://www.itu.int/home/index.html)
13. TOMORROW – Global Sustainable Business Magazine

- http://www.tomorrow-web.com/tomorrow_who.html; see also Senior Correspondent Ann Goodman : E-mail : goodmanann@aol.com
14. Union des Associations Internationales – www.uia.org
15. UOC Universitat Oberta de Catalunya: http://www.uoc.es/web/eng/index.html
16. World Business Council for Sustainable Development http://www.wbcsd.ch/contactus/meetus.htm

Information on the following EU Research Projects on the Network Society, Information Society Technologies, and Sustainability can be found on the CORDIS Website: http://www.cordis.lu/ist/projects.htm, and from the sites of key projects *:*

1. ASIS (Alliance for a Sustainable Information Society) - www.faw.uni-ulm.de/asis/welcome.html
2. ASSIST (Achieving Sustainability by Substitutive Information Society Technologies) – www.ecoplan.org/assist
3. Digital Europe – www.forumforthefuture.org.uk
4. E-LIVING – E-mail : ben.anderson@bt.com
5. EMERGENCE (Estimation and Mapping of Employment Relocation in a Global Economy in the New Communications Environment) – www.emergence.nu
6. FAMILIES (A study of the interactions between family trends and new work methods in the Information Society) - www.families-project.com/
7. SANE (Sustainable Accommodation for the New Economy) – www.saneproject.com
8. SIBIS (Statistical Indicators Benchmarking the Information Society) – www.sibis-eu.org
9. STAR (Socio-economic Trends Assessment for the Digital Revolution) – www.databank.it/star
10. SUSTEL (Sustainable Telework – Assessing and Optimising the Ecological and Social Benefits of Teleworking) – E-mail : p.james@ukceed.org
11. TERRA 2000 – www.terra-2000.org

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