



Contribution to the Earth Summit

Towards a sustainable knowledge society

Perspectives on the potential of Information Society Technologies

Recent years have seen substantial responses to the challenges of Sustainability. Unfortunately, our understanding improves relatively slowly and global problems move rather quickly. This summit provides an ideal opportunity to assess how far we have come and how far we need to go; but most importantly must address precisely how we should proceed and where our best hopes for salvation lie. The TERRA project addresses this need.

'Magic bullet' solutions do not exist: too many imprudent claims have been made in the past (both good and bad) for any further bold claims to be well received today without the clearest possible of proofs.

One bold claim, however, cannot be easily set aside. The new technologies of the Information Society (ISTs) and their accompanying New Economy seem likely to offer scope to enable economic growth, and to allow a more equitable distribution of wealth, without increasing consumption, pollution and energy use. The TERRA research project looks critically at these claims, developing scenarios and models that describe and explore the effects of ISTs on societies and economies, in order to guide the development, use and implementation of ISTs, into routes most beneficial to sustainability. Proper understanding is essential to future action – insight has to inform foresight.

TERRA is a multi-disciplinary, multi-national research project¹ which utilises scenarios and models to unpick the contribution made by the technological and scientific developments of the Information Society, from those contributions made by previous waves of innovation in science and technology. In doing so, it also tests the hypothesis that the true innovatory significance of IST lies in its ability to enable the doing of totally new and quite different things. Because we are only now beginning to see the first signs of these new characteristics of the gradual maturing of the Information Society, hard proofs are not always readily available – but analysis of previous waves of innovation tends to support the expectation that IST-derived innovations will prove of sufficient importance to form the primary basis of our answers to sustainability questions for the next quarter century or more.



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TERRA's Understanding

The relationship between the Information Society Technologies (ISTs) themselves, and their wider societal impact in the shape of the New Economy is being elaborated by TERRA in a linked series of narrative scenarios and numerical models concentrating on identifying and expanding the most crucial aspects of the picture – the so-called Dominant Relationships. The wider picture is, in its totality, quite complex: ISTs, like all revolutionary technological advances, extend out into the real economy in ways which, although profoundly influential, can seem at first glance erratic and arbitrary. By detailed analysis of the socio-economic effect of ISTs, and with the added benefit of analysis of previous technological advances it is nonetheless possible to identify the sequence of the spread of innovation, and the matching areas of public policy interest and possible intervention points, that enable positive impact on sustainable development.

Key features of this include:

- IST offers vast scope for innovation – but not unique scope. Radical changes in scientific and technical understanding have taken place many times previously and we therefore have good prior examples to guide us.
- The effects of any radical new technology initially merely mimic what was done before, offering in consequence only marginal improvements, before the real innovation (of doing new and different things from what had been done before) takes over and begins to offer radical benefits. This full development process may take decades.

- Each previous wave of radical technological change has had its 'New Economy' typically characterised by discontinuity with its predecessor.
- The first socio-economic effects of radical technological changes (such as IST) are frequently adverse (see the Luddites or the mass unemployment of the 1980s).
- It is only then the secondary (rebound) effects of innovation follow and reveal large socio-economic benefits and these necessarily lag (perhaps by years) behind the primary effects. Such rebounds² have outcomes that include both the benign and the malign – TERRA distinguishes between the two, and provides guidance to maximise the benign and minimise the malign.
- Ultimately, however, the benefits of technological advance follow strongly and may extend over very long periods of time. ISTs uniquely offer these benefits in a way that favours sustainability.
- It is necessary to see this rather tortuous development progression in its entirety in order to model its effects. In particular, a clear understanding of the operation of the various rebound effects and of the means of harnessing and controlling them is vital if the full potential benefits of the Information Age are to be realised.
- It is possible that those less developed countries that are taking full advantage of the

² As an example of a rebound effect, efficiency increases have reduced CO₂ emissions in OECD countries by 6 billion tons in the last 30 years – but increases related to economic growth, 9 billion tons, have outstripped decreases due to efficiency..

Information Age will leap frog into the mainstream of the world economy. Mimicking the consumerist errors of the West, they would train considerably the life support system: TERRA aims to identify the means whereby they might avoid such mimicry.

Unpacking the Important Issues

Three specific issues are used in TERRA as an organising device by which the project focuses and organises its work on the meeting of policy challenges:

1. **Human capital in the information age** – i.e. the distribution of knowledge and skills, as economic inputs that are distinct from labour per se. While the term arises from economics, there are clear social and environmental aspects to the issue. The link to ISTs comes through new skill requirements and expanded labour markets and policy responses. Associated policy areas include: mobility of workers; education; mobility of work (and enterprises); and changes in labour productivity and/or skill requirements. Terra is modelling and explaining the complex interlinkages between skills, human capital and socio economic development.
2. **Equity and growth** – inequality (and inequity, fairness, etc.) refers to differences in wealth; in welfare; access to social support systems, etc, etc, that can jeopardise social sustainability. Existing inequalities may be magnified by ISTs (i.e. the Digital Divide). It is precisely those disadvantaged groups such as migrants or those lacking language skills or access to education who,

for example, experience reduced access to the Internet – and thus to the range of information, goods and services it offers. There is thus a strong possibility that the potential of ISTs to reduce inequality may not be realised. Policies range from redistribution (which is clearly problematic) to ‘egalitarianising growth’ and the creation of Leap-Frog possibilities. Terra is developing amore detailed understanding of inequity and the means by which it may be addressed.

3. **Information age sustainability** – ISTs profoundly affect the environmental, economic, societal and cultural dimensions of sustainability. In particular, environmental impacts may have positive or negative effects on ‘sources’ (life support systems and resources) and ‘sinks’ (human domination of nature from biodiversity to climate change). On the one hand, ISTs bring a burgeoning middle class (increasing consumption loads) and, on the other, more efficient extraction (accelerating exhaustion and delaying development of substitutes). Rebounds and secondary and tertiary effects are already well understood in some circumstances – but by no means all. TERRA is expanding understanding of Rebounds. Policies can include informational approaches to enhancing efficiency of resource use, corrective taxation, support for development of alternatives, etc.

These are, of course, not the only issues under examination – but they do allow TERRA to focus, and to bring some clarity to the complex issues concerned.

TERRA outcomes

TERRA's work thus deals with the analysis of well established past and current data: however its work results not only in insight into the manner in which innovation produces benefits, but also in the opportunity for foresight, by outlining the likely future possibilities. In this way the hypothesis that ISTs offer the route to a sustainable future can be put to a fair and realistic test, while the TERRA analysis of Dominant Relationships helps to identify those specific 'signposts' and 'policy levels' most important to the attainment of sustainability. The TERRA modelling tools (particularly the 'IFS for TERRA' model) allow the assessment of the efficacy of potential policy actions. The outcome will be clear guidance on how we should act now if we are to achieve the maximum benefit, in the future, from the Information Age; what policies we should implement; what should be encouraged, and what discouraged. The possibility remains strong that ISTs, implemented in line with TERRA's guidance, may yet prove to be the cornerstone of building a sustainable future, provided only that we understand what is happening and what is likely to happen, and then act accordingly. TERRA provides some of that understanding, in order to inform the necessary actions.

TERRA and the Earth Summit

It is widely anticipated that the Earth Summit will result in commitments being made by governments to specific targets on the road to the achievement of sustainability. If that is the case, it will be necessary to develop policies that will enable achievement of these targets. TERRA offers the means to develop policies relating to the invoking of ISTs and the New Economy as a major contribution to the achievement of sustainability targets, together with the means of modelling and elaborating the socio-economic effects of policy decisions in this area. In total this will allow governments to both plan their actions and make reasonable assessments of the likely effects of those actions.

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