

TARDIS 2012 Time-Frames for Sustainability Summary Brief

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TARDIS 2012

The 2012 Trans-Atlantic Research and Development Interchange on Sustainability (TARDIS 2012) was a workshop of twenty-five invited thinkers from the United States and Europe representing a broad range of disciplines. TARDIS 2012 is the fourth in a series of workshops addressing specific aspects of sustainability. The TARDIS Workshops have been held under joint sponsorship of the Ministry of Education, Science, and Culture of the Federal Republic of Austria and the U.S. Environmental Protection Agency, Office of Research and Development. TARDIS 2012 was held at Schloss Seggau in Leibnitz, Austria in April 2012. The present document is a consensus summary of the discussions among the participants at the workshop. It does not represent an official position, or policy or regulatory proposal from the Ministry of Education, Science, and Culture of the Federal Republic of Austria, the U.S. Environmental Protection Agency, or any government organization.

Sustainability

As was succinctly articulated by the Brundtland Commission¹, sustainability is essentially an effort to insure that the Earth is able to meet the needs of present and future generations of people. The origin of the term sustainability² seems to come from the fusion of two Latin words “*sus*” and “*tenere*”, respectively meaning “up” and “to hold.” But the first use of sustainability in the modern context appears in a research article in *The Ecologist*³.

Sustainability is, hence, a construct of the human mind. At its core, it implies a concept of stability that cannot be found in a natural world, which is inherently dynamic. Conversely, the closely related concept of resilience can be found in the natural world – particular ecosystems such as the Sahara Desert have been known to persist at least through historical times. However, in the context of sustainability, resilience is about the persistence of civilized human existence in the face of changing conditions.

To better frame the argument, we consider the traditional three pillars of sustainability: environment, society, and economy. Sustainability cannot be found in the environment,

¹ World Commission on Environment and Development. *Our Common Future*; Oxford University Press: Oxford, UK, 1987.

² Guralnik, D.B. (Ed). *Webster's New World Dictionary of the American Language*, 2nd Coll. Ed.; The World Publishing Company: New York, USA, 1972.

³ Goldsmith, E.; Allen, R.; Allaby, M.; Avoll, J. *The Ecologist*, 1972, 2 (1).

which is constantly changing both cyclically and more or less reversibly and non-cyclically and irreversibly. Sustainability cannot be found in economies, which go through repeated cycles of expansion and recessions, and where these cycles seem embedded in longer time processes over which particular categories of business activities develop, expand, recede, and disappear. Sustainability cannot be found in societies, which also evolve and change constantly with political cycles and on longer time-frames with changes in political structures and social habits and customs.

So then, what is sustainability actually? Sustainability is about creating a system, mode of existence, or path through time which is: (1) favourable to civilized human existence, and able to provide for human needs, (2) sufficiently stable to continue providing for human needs at least on the time scale of several human life-times, and (3) sufficiently resilient to perturbations and changing conditions to meet the aforementioned requirements without rapid regime changes over time scales shorter than a human life-time. Sustainability is then very much tied to time and time-frames as will be explored next.

Time Frames for Sustainability

The reality in which human beings exist is a complex one involving at least elements from the environment, the economy, and society as already articulated. As already implied, each of these three has its own set of characteristic time-frames not always in agreement. These issues we will now discuss.

The environment includes biological systems, which cyclically change with the yearly seasons, longer climatic and biological oscillations, e.g. the forest-savannah ground cover cycles⁴, and the rise and extinction of species through irreversible evolutionary processes. This also seems to be the case for the physical environment, which changes cyclically with the yearly seasons, over multi-year cycles, e.g. La Niña-El Niño climatic oscillation, and irreversibly over time scales ranging from centuries to millions of years, e.g. consider that the earth seems to have had multiple very cold ice ages and very warm ice-free epochs⁵.

The economy has its own multiple cycles and irreversible processes of change each with its own characteristic time-frame as well. For example, the World economy is now recovering from a major recession that started around 2008, and which seemingly will span over several years. On a longer time-frame, steel manufacturing, which was the dominant economic activity in some American cities such as Pittsburgh, Pennsylvania, has receded over decades to a relatively modest component of the economy, in what may well be an irreversible change⁶.

⁴ Earley, L. S. (2006). *Looking for Longleaf: The Fall and Rise of an American Forest*. UNC Press.

⁵ Sigman, D.M.; E.A. Boyle (2000). "[Glacial/interglacial variations in atmospheric carbon dioxide](#)". *Nature* **407** (6806): 859–869.

⁶ Warren, K. (2001), *Big Steel: The First Century of the United States Steel Corporation, 1901-2001*. University of Pittsburgh Press.

Society has its own multiple cycles and irreversible processes of change as well, each with concrete time-frames⁷. Social customs and habits can change over decades as evidenced by new tastes in food, clothing, and entertainment, for instance. At least in the case of democracies, political election cycles range from two year for American congressional representatives to seven years for presidents of the Fifth French Republic. On a longer time-frame, political institutions across the World have generally evolved towards increasing popular participation over the last two hundred years or so, with universal suffrage being adopted in nearly all democracies and increasing popular participation elsewhere. These many different cycles and processes operate over a very wide range of time-frames ranging from years to centuries to millennia.

Time Frames for Management for Sustainability

Since sustainability seems to be mostly about managing so as to support and maintain civilized human existence, it is then necessary to somehow account for and to accommodate all of the aforementioned time-frames simultaneously each originating from a different set of cycles and processes: environmental, social, and economic. This is not an easy task, particularly because the political and societal time-frames over which human action can be decided, planned, and implemented often do not match well with the time-frame over which the target cycle or process operates. Additionally, the economic time frames over which the benefits could be realized do not match well the cycle of the target process, and this adds to an already challenging situation. We focus here on the time-frames for political and societal change because they are the two time-frames over which humans may have some degree of control. Conversely, there seems to be no really effective way for people to control the time-frames for many environmental processes, e.g. biological and climatic, or even many economic ones, e.g. business cycles seem to operate on their own internal dynamics.

As already implied, political time-frames range approximately from two to seven years for many democracies - possibly longer for some parliamentary systems. One can then expect that the political system would be most effective at making decisions and implementing policies that operate on processes having time-frames near that of the political cycle. Hence, when the target cycle or process naturally operates on a time-frame similar to the political cycle, there is a good chance that the policy, if well formulated, will be implemented and will be effective. For example, in the United States the establishment of environmental protection laws and the development of enabling regulations have taken place on time-frames near that of the American presidential political cycle. That is, the results in terms of say improved air quality become manifest over a few political and economic cycles making the benefits manifest within a relatively short time-frame. For processes such as climate change that operate on time-frames much longer than that of the political and economic system, agreement has been slow and far more difficult. One suspects that one of the challenges is the fact that results of a policy on say climate change would not be evidently

⁷ Smelser, N.J.; Baltes, P.B. (2001). [International Encyclopedia of the Social & Behavioral Sciences](#), Amsterdam: Elsevier.

manifested except on a time-scale much larger than that of the economic and political cycles.

Management for Sustainability

The difficulty with having the political system address sustainability issues, which often operate on a longer time-frame consistent with their own dynamics, perhaps points to the need for finding an alternative path to solving or at least ameliorating this category of problems. Noting that societal change often operates on a much longer time-frame than the political cycle, using social change as way to address long time-frame environmental problems such as those associated with sustainability may conceivably be fruitful. Hence, environmental issues such as land-use change that operate on a time-frame much longer than that of the political and economic processes would probably be better addressed by policies oriented towards societal change. For another example, one could consider addressing climate change with policies aimed at discouraging urban development in low coastal areas, energy conservation, the use of energy sources with lower carbon emissions, etc. While policies for societal change can take a long time to have an effect, the issues they target are slow moving as well.

There are possibly two requirements for the establishment of policies for societal change: a supporting legal framework and long-term political support for the enabling regulation. All actions have to happen within the bounds of accepted law. However, basically, societal change is driven by policy, which must have a basis in laws on which regulations can be developed. Both have to be maintained long-term over many political cycles in order to see societal change, which can address sustainability issues. This is not always an easy task, and it does not completely resolve the aforementioned problem of time-frame mismatch between the political and the natural cycles associated with sustainability. However, it may help to ease the process by focusing on social change rather than strict regulation with a short time-frame. If maintained long enough for the benefits to become manifest, such actions may act to strengthen the political support which is necessary for societal change to occur. Efforts are underway in the European Union to reduce carbon emissions through regulatory process in an effort to help manage climate change, and it will be most interesting to see how the process is managed over time.

Summary

Given the TARDIS 2012 discussions, it is clear that the disparate time-frames associated with the operation of the processes important for sustainability create a significant challenge to successfully finding a practical path to sustainability. Further, this is not a proposal for policy or regulatory changes from any government body, but rather a summary of the participant discussions at the TARDIS 2012 workshop. The hope is to stimulate the generation of fresh approaches to a very challenging problem. It is, therefore, important to summarize the most salient points to inform the discourse on sustainability time-frames that workshop results brought out as principles that can help address these issues:

1. Sustainability is a human construct aimed at assuring civilized human existence over the long term. It may not be completely achievable, but one can imagine systems with enough stability and resilience to provide for the needs of human society for a long time.
2. Sustainability and its support systems (environment, economy, and society) are not completely steady-state, and they operate on many different time-frames ranging from years to millions of years. The time-frames associated with the environment, the economy, and society including political cycles do not generally match, and great care must be taken to try to develop effective action under these circumstances. This may be the overriding challenge of finding a practical path to sustainability.
3. There are possibly only two time-frames over which humans have some degree of control: political and societal. In constructing effective sustainability policies, great care has to be given to finding ways to match or accommodate the political and/or societal change time-frames to the time-frame of the issues being targeted by the sustainability policy. In addition, it will also be necessary to consider economic time-frames so that the benefits can become manifest proving visible value to society.