

It's about time!

Addressing social and environmental degradation

Our relationship with time has been deeply changed by modernity. At the University of Lisbon, Prof Filipe Duarte Santos has examined how humans have dealt with time through history. He argues that technology drives cultural, social, economic and political change, and can fulfil our wildest dreams; it drives an irresistible need to fill up time completely. Yet time remains unconquerable, and our energy-greedy modern life is generating a dangerous environmental toll. Addressing the global issues that are besetting mankind and reaching sustainability requires a deceleration of operative social time, and the progressive adoption of a one-tribe-on-the-planet viewpoint.

The concept of time has undergone all manner of changes across human history, with the variety of perspectives and viewpoints a testament to humans' inexhaustible potential for creativity. Recently, and for most of Earth's human population, our relationship with time has been deeply changed by modernity. We now live under the constant pressure of time acceleration, with an irresistible need to fill up time completely and permanently. Current cultural norms drive a need for everything planned, for self-interest, and for everything possible or enjoyable. Concurrently, future time has become increasingly dominant, menacing, and uncertain.

At the University of Lisbon, Prof Filipe Duarte Santos has been looking at how Homo sapiens have dealt with time through history. His most recent work has focused on trying to explain how 'new time' has emerged, in an attempt to better understand current global civilisation and to shed light on the future, with a focus on the role played by science and technology. Prof Santos argues that technology has always driven changes in cultural, social, economic, and political transformations. However, the dominance of technology has reached new levels. Technology has become our omnipresent magical companion, able to fulfil our wildest dreams. Today, well-being, entertainment, economic prosperity, consumerism and all the excesses that make life exciting are available at the click of a button (or swipe of a finger) to a world minority;

the remainder expect to reach the same perceived advantages.

However, time is different from all of the other constraints that science and technology have helped humankind to overcome. It remains, to our chagrin, unconquerable. Technology is utterly unable to change or improve its nature for our benefit. In his examination of time, Prof Santos has considered historical narratives around the advent of progress, growth, and technology with respect to operative social time, historical time, psychological time, biological time, and physical time. The continuing interaction among these concepts has contributed decisively to influencing and characterising our long cultural evolution, which can be traced back to the Upper Palaeolithic, when Homo sapiens first developed complex social behaviours that shaped cognitive and symbolic thought.

THE ACCELERATION OF TIME

Operative social time is the operational form of temporality that we use in our daily lives to think and communicate time with others. It is structured by events and expectations experienced in the social context and reflects the pace of change in various aspects of our surroundings; in other words, it conditions the way we use the time we have. The operative social time of a Palaeolithic hunter-gatherer was different from that of a worker building the Great Pyramid of Giza, or that a modern-day New York stockbroker. Throughout human history, each society with a well-defined identity has had its own operative social time and operative time structure.

In the modern era, time has become increasingly important for the economy, as typified in statements such as "time is money" (Benjamin

Franklin, 1705–1790). Each person has acquired an economic and financial value that is measured by the monetary value of his or her time. At first glance, we are all tempted to describe life as a cycle, but at a certain point, we begin to recognise that time is bounded. We then normally take steps to make sure it is as long as possible, enabling us to fulfil as many of our expectations and ambitions as possible. Having full awareness and accepting the opportunities and restrictions of this element of operative time is a recurring motive for anxiety, hope, responsibility, and sometimes disappointment and anger.

The time of a social generation is an element of operative time with cyclical characteristics, in the light of the succession of social generations. In contrast, a human lifetime is well-defined, unique, personal, and cannot be repeated. Dealing with these opposing natures is perhaps the greatest challenge that faces Homo sapiens. To what extent should we appreciate and prioritise something that is unique and personal over our active participation in the social generational cycle? To what extent are personal interests compatible or incompatible with the interests of future generations? The tension between these driving forces shapes our approach to sustainability and intergenerational justice.

The concept of time has gained in importance since around the 16th century, when we became able to accurately measure time, and use technology – clocks – to regulate human activities. As such, operative social time increased in economic and financial value. From this perspective, Dr Santos argues that modernity is, to a large extent, the history of time.

Other markers in the evolution of modern 'time' were the Agricultural and Industrial revolutions. With the Agricultural Revolution, we became accustomed to surpluses in the production of goods; this drove economic prosperity, but also inequality, the concentration of power in the hands of the few and the start of a long history of large-scale wars. With the Industrial Revolution we saw prototypes of our



Print of the first hydrogen balloon flight, with Jacques Charles and Nicholas-Louis Robert ascending from the Tuileries Garden, Paris, on 1 December 1783.

Photo credit: World History Archive/Alamy Stock Photo



NASA astronaut Robert L. Curbeam (left) and ESA astronaut Christer Fuglesang participate in extravehicular activity for the construction of the International Space Station, 12 December 2006.

Photo credit: NASA

For most of Earth's human population, our relationship with time has been deeply changed by modernity.

current operative social time structure. Factory working required strict working hours to maintain profits; this time-rigidity soon spread to other professions and facets of life. The concept of 'wasting time' was born, along with the threat of lost opportunity should one do so. Since then, the tempo of life has continued apace.

From production to communication, everything is faster than ever before. To meet this growth, energy demand has soared, taking a significant environmental toll, including the

burning of fossil fuels, nuclear accidents and a wide range of environmental disasters, etc. Humans increasingly dominate and control the evolution of the biosphere, a global system that had evolved to a finely tuned system, within which biomaterial is recycled after death. Things could not be more different in the encroaching technosphere; materials are exhausted and discarded, destroying their raw value. The consequences are huge; decisive societal change no longer takes longer than a human life, and as such we face a constant need to

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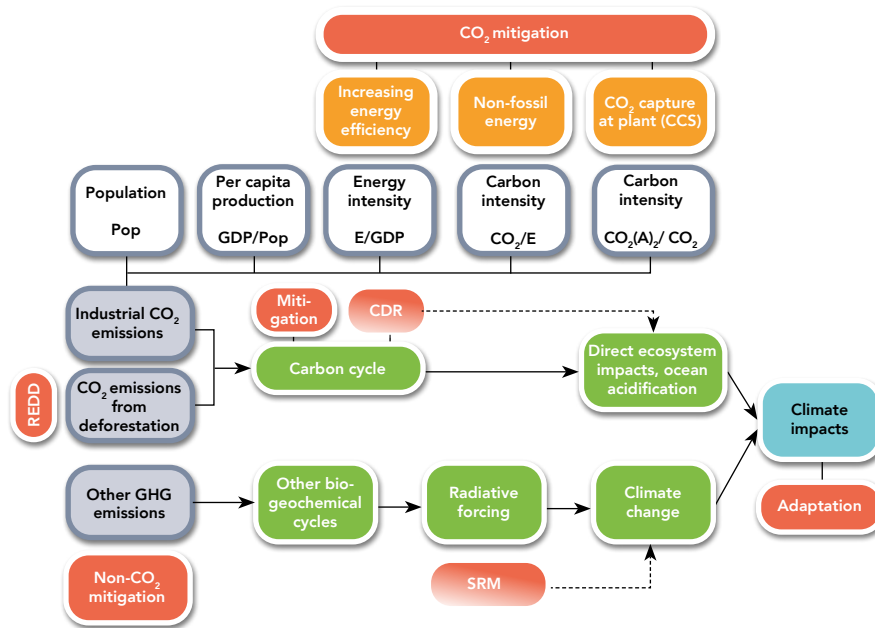


Diagram illustrating the relations between the human, socioeconomic, and climate systems and the processes of mitigation, adaptation, and geoengineering in its two forms, carbon dioxide removal (CDR) and solar radiation management (SRM).

adapt, even on an individual scale. It is not inconceivable that technology will be the tool that allows this, through human enhancement and the development of transhumanism. If transhumans start to emerge in relatively large numbers, they may ignore, dominate, or fight the more primitive humans, which would imply that the end of Homo sapiens time

increasingly becoming an ethical and moral issue. Intergenerational solidarity plays an essential role in the way we deal with climate change and other environment challenges.

CRISES OF THE MODERN WORLD
Humankind is now following an unsustainable path encircled by five main, strongly interrelated and

In the encroaching technosphere, materials are exhausted and discarded, destroying their raw value.

may be closer. Recognition of humans and post-humans as two types of distinct 'species' will necessarily involve a long and difficult process.

Although all of us regularly make intertemporal choices, our rates of time preference or time discounting rates are different and variable. Those with a high rate of time preference tend to favour their short-term self-interests; those with a low rate of time preference assign greater importance to their longer-term interests. Increasingly, we are seeing an increase in the rate of time preference, for example in our eating habits, personal savings, and consumer habits. Future generations will suffer from our 'now' focus, and solidarity between generations is

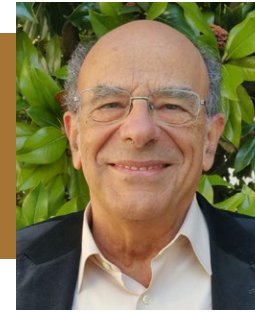
dangerous crises: the COVID-19 pandemic, the debt crisis, increasing socioeconomic inequalities (at global and national levels), the environmental crisis, and climate change.

Loyalty to the social group, in particular regarding behaviour and way of thinking, and discrimination or animosity towards members of other social groups, is frequently called tribalism. Tribalism is deeply rooted in our cognitive system and is common to us all. Broadly speaking, however, our tribalism makes it difficult to deal with global problems like global environmental changes and climate change. Addressing such issues will require a one-tribe-on-the-planet frame of mind – in other words, putting

the interests of humankind over the diverse self-interests of each 'tribe' (e.g., sovereign states). Such a scenario is unlikely, given current geopolitical conditions, the present-day tensions between the West under the leadership of the USA and China being a case in point. So the question is, how can we achieve global sustainability and solve the environmental and climate change crises?

Technological success replaced sociality with self-interest. Reaching the sustainability goal will require three crucial measures. First, we must recognise that global problems are very difficult to solve, and that the wisdom gained by knowing ourselves better is essential if we are to find workable solutions. Second is the progressive adoption of a one-tribe-on-the-planet viewpoint, guided by the United Nations Sustainable Development Goals for 2030. Thirdly, we need a change in the discourse of political leaders, with a fresh and frank focus on addressing these crucial issues. In short, we face a choice: adapt to the adverse future that we have created or rebuild a new, more propitious future by a transformative process of self-regeneration.

The crucial condition for the success of this plan is to decelerate operative social time and, as far as possible, to be at peace with time. If deceleration at the global level turns out to be impossible, then it will be extremely difficult to reach any form of sustainable development. In this scenario, humankind will continue to be assailed by crises arising from impracticable models for perpetual economic growth coupled with overexploitation of natural resources, environmental degradation, biodiversity loss, and climate change. Such crises will inevitably increase poverty and inequality, and decrease social inclusiveness, well-being, and economic prosperity around the world. Dr Santos believes this is too high a price to pay for failing to find a sustainable pathway into the future. Human wisdom and foresight may prevent that outcome. Ultimately, time resolves all human issues and uncertainties, one way or another.



Behind the Research

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Research Objectives

In his book "Time, Progress, Growth and Technology. How Humans and the Earth are Responding", Professor Santos outlines global problems, including a detailed analysis of the scientific, social and economic aspects of the climate crisis.

Detail

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Bio
Filipe Duarte Santos holds an MSc in Geophysics from the University of Lisbon and a PhD in Theoretical Nuclear Physics from the University of London. He is a Full Professor of Physics and Environmental Sciences at the University of Lisbon and Director of the PhD program on Climate Change and Sustainable Development Policies, a collaboration between the University of Lisbon, New University of Lisbon and University of East Anglia, UK (<http://alteracoesclimaticas.ics.ulisboa.pt/en/>). During the period 1970-2007 he was visiting Scholar or/and Professor in several Universities of Europe, such Oxford, Surrey, the Technical University Munich and in the USA, including the University of Wisconsin-Madison, University of North Carolina at Chapel Hill, Duke University, Stanford University and Harvard University.

His present area of research is climate change and sustainability. He has published more than 160 papers, various books, including "Humans on earth. From origins to possible futures" (Springer, 2011), and coordinated more than 50 research projects in physics, climate change and sustainability. Prof Santos is presently chairman of the Portuguese Council of the Environment and Sustainable Development, a member of the Lisbon Academy of Sciences and a member of the Environment Steering Panel of the European Academies Science Advisory Council- EASAC.

Collaborators
This book would not have been possible without the enlightenment and help of a large number of people. It reflects the author's many experiences and knowledge gained around the world, especially in Europe, Asia, and North, Central and South America. It benefitted from fruitful dialogues and debates with colleagues and friends in various institutions, especially in academia.

References

Santos, F. D. (2021). Time, Progress, Growth and Technology: How Humans and the Earth are Responding. Springer Nature, Switzerland. Available at: <https://doi.org/10.1007/978-3-030-55334-0>

Personal Response

Do you think humans will rise to the challenge and restore sustainability before it is too late?
// We will always be on the edge hoping to find evidence to support a positive outlook. Society rejects a negative outlook and if there is evidence for it, it tends to negate the evidence. Post-truth is likely a symptom of that trend. The crucial point is to inform society and struggle to provide the scientific explanation of what we are observing in the world regarding its increasing complexity and the consequences of the overexploitation of natural resources, environmental degradation, the increasing risk of zoonoses, like COVID-19, and climate change. About 20% of the world population lives in countries with advanced economies. This segment must develop solidarity, active cooperation and resource sharing with the 80% that do not enjoy the same mean well-being and economic prosperity of the more advanced countries. Personally I am always trying to find the signs that justify a positive outlook. I deeply believe that the signs will appear but I am far from being sure that I will find those signs during my lifetime. My outlook is dynamic and adaptable.

Can suitable change come from sub-national levels, or do the necessary changes require nation states to act together?
It is impossible to address global challenges successfully if nations do not act together. If it turns out that we are unable to reach some form of sustainability at the global scale then the well-being and the economic prosperity of most of mankind will decrease. Nevertheless, billionaires are likely to survive since they are very resilient, being one of mankind's greatest sources of pride. To reach sustainability, it is more rational to adopt voluntary simplicity (discussed in the book) as a guiding ideal. But that is a tremendous change from a world dominated by consumerism, self-interest and Ayn Rand's form of rational egoism. At present, no political party is able to win an election and govern with a program based on voluntary simplicity. Economic growth is the overwhelming priority and the essence of the confrontation between the West and China because it is a source of power. But the two need to cooperate if sustainability is to be achieved. Economic growth is important but there are other values that should acquire greater political relevance throughout the world.