

Attention Earthlings!

By Andy Ross

Spaceship Earth is the greatest machine that human beings can ever hope to build. Well before the planet is shipshape, natural-born humans will have ceased to exist. That won't stop them building it. It will stop them taking command.

Before you can make a go of piloting a spaceship, you need to know what sort of machine it is, how the controls work, where you want to fly it, and what you want to achieve with it. These are four things we need to be clear about for Spaceship Earth. Then we can take over. So let's check off the wish list.

What sort of machine is Spaceship Earth?

Machines are specific configurations of stuff that do something. In the case of the Earth, the stuff is mostly rock of various kinds. The mass of the rockball that forms the Earth is six zettatons, of which about one exaton forms a thin and dynamic layer of water on the surface. The mix of elements in the solid and liquid surface layers of the ball supports a complex chemistry that we know as life. Over several billion years, life on Earth has evolved into an array of species that now includes humans. By civilizing themselves and organizing their efforts, humans have learned to exert some level of control over various events and processes in the planetary exosphere. In recent years, this control has begun to resemble the fumbling operation of a planet-sized machine.

Machines do work. They have input and output, and they relate input to output in specific and planned ways. Earth has sunlight as input, and lots of it. The power delivered continuously in solar radiation to the sunlit half of the planet is about a hundred petawatts, or about a thousand Hiroshima bombs per second. This is much more than enough to meet all human energy needs with presently planned and projected lifestyles, so long as that raw energy is properly collected and exploited. At present, the main collection mechanism involves extraction of atmospheric oxygen from carbon dioxide and water via photosynthesis and underground sequestration of hydrocarbons in the remains of dead organisms, as fossil fuel, and the main way to exploit the resource is to burn the fuel in air. Some of the energy of combustion does useful work. On a planetary scale, the output of that work is a growing stock of cities and other infrastructure in a process that resembles crystallization.

Considered as a machine, Earth turns solar energy into the massive geometric works of civilization. Humans expedite the transformation and use their brains to plan and orchestrate the crystallized forms that take shape around them. Their brains create and manipulate little models of these forms and strive to adapt the forms to satisfy their needs for food and shelter and their lusts for power and pleasure. Their mental models are linked via logic to the external forms they seek to steer, and the linkage allows a modicum of control. To the extent that the geometrization of the Earth's surface resembles the operation of a machine, humans control that operation by manipulating the models and their linkage to the crystallized forms. Humans conceive and deploy models as a way to plan new forms and to steer their hands and tools to make those forms from the raw materials in the natural environment.

How do the controls work?

Command and control are psychological notions. Agents exert will and realize their intentions. They steer a passage through time as they selectively realize new worlds. They entangle with forms in their virtual futures and shape the forms they realize into models they can use. They make the models methodically to serve specified purposes. The models inform their actions and help them to act out their purposes and realize their intentions. Thus humans transpose and translate future visions into present

actions. These in turn become past achievements that spur them ever onward in the endless task of building up a more congenially ordered landscape. In ways both trivial and grand, humans exert will to transform dreams into achievements.

The psychology of translating arrays of possible futures into actionable models is interactive. Agents don't need to know what the future holds before they start making models. They make up essential parts of the future as they go along. They work within guiding constraints that channel their actions into productive directions, where modular forms already exist to help them make faster progress. People often find that simply iterating past successes can take them further. Hence the forms that grow up around them show regularities that betray a bondage to tradition. They keep on making things as they did before until they learn to do better. To do better, they consider which constraints still apply and decide where and how their guiding principles can safely be adapted or replaced. All this involves psychology that the human species is still groping to understand.

To control developments on planet Earth, the biggest levers are choices as to which energy sources and raw materials to exploit. Beyond that physical level, humans make choices about the locations of cities and other infrastructure, the cultivation and preparation of foodstuffs, and the standardization of modeling techniques and processes. They let scientific findings about energy and materials influence policy directly, just so long as they agree on the logic and practice of the relevant science. Questions about cities and foodstuffs more visibly involve politics and preferences, and scientific findings about geology or climate change or population density or nutrition often come behind considerations involving pork barrels, pork taboos, piggy appetites, or pig-headedness. As for modeling techniques and processes, people often short-cut scientific methods in favor of artistic license, or educational or linguistic tradition, or political prejudices, or prophetic words.

In all these control levers, a scientific approach would improve things, measured in terms of achieving the results that people who think about these issues at all regard as preferable. But here a problem of principle arises. Why should the people who happen to think about these things be allowed to implement solutions they find preferable? What mechanism ensures that a small group of relevantly educated humans will model and steer the progress of life on Earth more reasonably than Mother Nature does already with Darwinian brutality? Why don't those people just relax and let go their ambition to power and learn to trust the natural dynamics of life?

They can't because humans are driven by a self-meme that automatically expands to reflect and unify the contents of consciousness: *I am the equal and opposite of my world*. The self is doomed to yank the controls and see what happens.

Where do we want to go?

Human thought has a fascinatingly recursive quality. Given a logic pump, people work it and work it until it can deliver no more. Their efforts to model natural events and processes invite just such iteration. They model their own modeling efforts and push out the envelope. In recent years, their logical machines, both in the semantic spaces of newly quantified concepts and in the hardware field of high-performance computing, have let them do more. They can build online avatars to do the grunt work and even steer them with airy gestures and thinking caps. The worldwide cloud supporting the web is a virtual starship with real carbon footprints in giant server farms. Soon the prints will sprout new growths and terminate in robots by the billion that will reshape life on Earth.

As passengers and crew in the spaceship, humans still have plenty to do to improve the quality of the ride. Most of the ship's life support systems, from light capture through fuel burning and material recycling to food distribution and heat insulation, still invite big improvements in efficiency, if not complete replacement by retooled alternatives. Here the scientific consensus is clear enough and the

main obstacle is human inertia or slavery to habit or tradition. At the higher levels of recursive awareness, people can do a lot more than before to criticize and replace the timeworn ideas of their ancestors. All it takes to replace an old religion, for example, is to formulate and propagate something better. It takes more hard work than genius to find better alternatives and to fashion replacement institutions, such as social safety nets, to do duty for the sticky web of obligations spun in the shadow of religion. Ongoing renewal from within of the social fabric around the planet can keep humans busy for several more generations.

Humans like to feel assured that things are getting better. But most people feel the need to get more from life than a series of incrementally faster and more efficient transport systems, bigger and more luxurious homesteads, tastier and more nutritious food options, more informative news channels, more exciting entertainment software, and so on, endlessly. As their horizons expand, they need to feel that the whole ongoing drama of life on Earth and in space is going somewhere. As the science of biology gives them ever more insight into the imperfections of the human condition, this means they're ready to see beyond the human term of office on Earth.

It's easy enough to continue the story. First, humans arm the edge of the cloud with robots to do all their hard work. Then they improve the robots so far through molecular engineering that machines do almost everything better than humans can. Finally, people put their neurological selves inside the bots, as living avatars, and go native in the world of machines. All this will come with levels of science and technology that the next decades or centuries will bring. Once people have reincarnated their minds in new bionic bodies, they can create a new world order.

What do we want to achieve?

What most people want is to lay foundations for a better future. People want to achieve happiness or fulfillment or enlightenment, or something like that. They want life to go beyond its present limits. People with little lives are trapped in the bowels of the spaceship. They want a way to rise above the pandemonium of selfish and venal peers that reduces all their efforts to messy compromises in politics and psychology.

Union at the level of higher mental processes is no novelty. People think as one in all the higher disciplines of mental endeavor, from mathematics to music, from physics to philosophy, and know how to overcome mere personal differences. But translating such union to the messy world of everyday life is hard work. Learning to appreciate the goal of global psychic union will no doubt keep humans busy for decades. But the achievement can crown their dominion as a species. Human brains can weave a global net so tight that they become in physical fact as well as in their own minds a single living organism.

That, in short, is our prognosis for the future of human life on Earth. By building up civilization so far that bionic bodies can dock and retool in a global network of molecular machines, people will overcome their little lives and become a living blob of planetary dimensions. Along the way, they will naturally embrace all other life on Earth, once they've revised and upgraded its genes and proteins to work in union. The union can even go deeper and appropriate the zettatons of rock beneath the surface.

With life on Earth united in a global organism of superhuman power and purpose, the human prehistory of that organism will be capped and trumped with convincing finality. The species will rest in peace as a precursor form in the great unfolding. Instead of just crewing or piloting Spaceship Earth, we can implement Globorg, a new form of life.

Andy Ross is the author of the book
G.O.D. Is Great: How To Build A Global Organism
available from July 2010 via Amazon