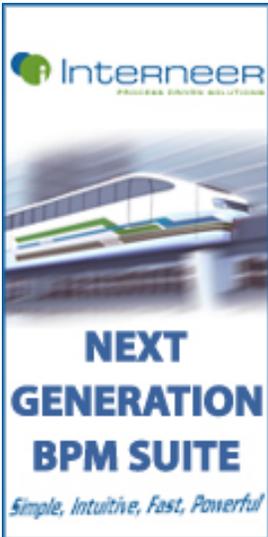


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Preparing for Change

We've all become accustomed to living with change. It's hard for someone alive today to believe that hundreds of years of human history passed without significant changes: Years in which generation after generation of farmers grew up learning their parents' trade, inheriting their parents' land and using the same basic tools their parents had used. Starting with the industrial revolution, in around 1775, relentless change has become a feature of modern life. Moreover, the rate of change is increasing. More countries are becoming industrialized, more individuals and organizations are focused on the search for newer, better, and cheaper ways of doing things, and new technologies are continually being developed that combine to create an explosion of new opportunities.

World Wars and economic recessions have led to temporary setbacks, but, overall, the world has been growing richer and more integrated with each passing decade. Books are currently being written about the rapid expansion in India, China and Brazil - which can be read on Kindle, if you prefer - and it has become common place to think that growth will proceed even faster in the next few decades, leading to ever greater prosperity. And, we all hope that this happens.

In fact, however, economic growth requires the consumption of raw materials of all kinds, it drives the growth of the world's human population and it generates waste. The main focus of environmental concern, today, is on global warming and the call is for a transition to technologies that will dramatically reduce carbon emissions.

In 1973 I co-authored an Ecology textbook. We began that book by asserting that no closed system (as for example, the Earth) could constantly consume an ever growing proportion of its resources. Eventually, any resource will run out. At the time, the book that focused everyone on that possibility was *The Limits to Growth*. The book had been written by a team of scientists who had studied at MIT's Systems Dynamics center and who had developed a model of how humans interacted with their environment. In essence, they considered the feedback relationships among population growth, the consumption of food, the consumption of resources of all kinds, the generation of industrial output, and the generation of pollution. When the study first came out, it was dismissed by leading industry spokespersons and by many economists. Both argued that the projections were based on wrong-headed assumptions and did not take into account the fact that one resource could always be substituted for another.

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Ten years after the original study was published, the same group published an update. In 2004, thirty years after the original study, the group published a second update. In each case, they updated their model, using the latest data on population growth, industrial growth and resource availability. Each time they refined their assumptions and introduced improvements to the basic model. The key thing, however, is that the results kept coming out more or less the same. Figure 1 reproduces the “standard” projection from *The Limits to Growth: The 30-Year Update* by Donella Meadows, Jorgen Randers, Dennis Meadows (Chelsea Green, 2004). This figure hardly varies from the figure we used in our Ecology book in 1973. The main difference is that it is now 2010 and not 1973.

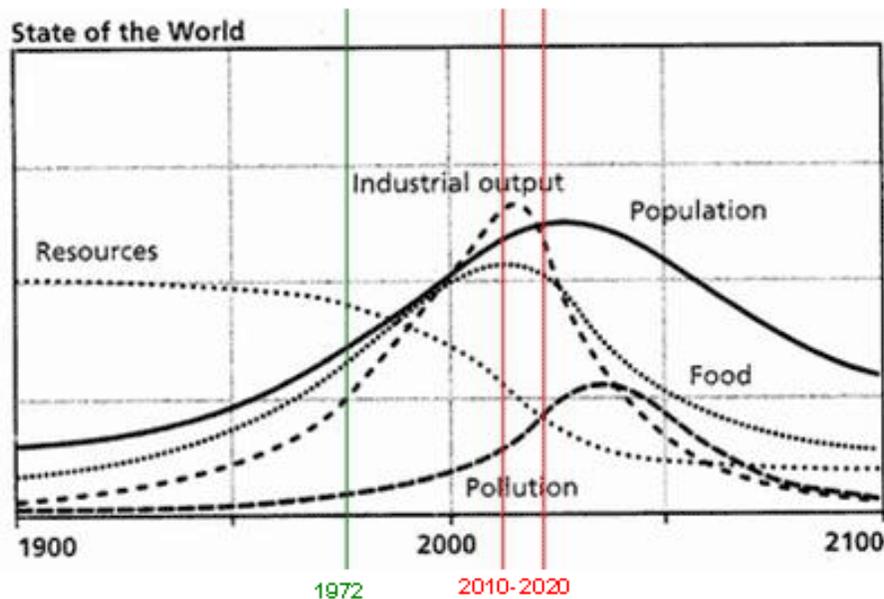


Figure 1. Standard Run – A projection of current trends, assuming no major changes.

Modified From: *Limits to Growth: The 30-Year Update* by Donella Meadows, Jorgen Randers, Dennis Meadows (Chelsea Green, 2004)

Limits to Growth: The 30-Year Update provides many different “runs,” which vary as different assumptions are tested. Thus, for example, they had a run that assumed that twice the amount of known oil resources would be discovered on the following day, or that industrial processes could cut carbon emissions by 25% over the course of the next ten years. In 1973, when we worked on the Ecology book, we made quite a bit of these alternatives, hoping that new resources would be discovered and that society would find the will to implement some of the more obvious changes. Today, I think it more likely we won’t make changes until things get quite a bit worse, and I now think the best guide to the near future is the latest version of the Standard Run which is shown in Figure 1.

I have added red lines to emphasize the decade we are entering. I considered terming it the “last good decade,” but that’s probably too pessimistic. It is, however, the decade when everything starts to change rather dramatically – just as the *Limits to Growth* study predicted in 1973.

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Most energy experts now believe that we have used more than half of the oil available. If we were consuming energy at a more or less steady rate, that would still leave us quite a bit of time to make adjustments. However, we are nowhere near a steady rate of consumption. Our use of oil is growing rapidly, at an exponential rate. China is searching the world seeking oil supplies while increasing its consumption at an alarming rate. India has just introduced a small car that they hope will put millions of Indians into the driver's seat - and each of those cars will need gas.

The UN has recently estimated that we will need to generate about 30% more food per year in order to feed the expected population of 2050. The Green Revolution that occurred in the 70s was very dependent on fuel and on phosphate fertilizers, both of which are becoming scarcer and more costly. I'm not sure anyone knows where that increase in food production is going to come from. Similarly, water is becoming very scarce in some areas and obtaining drinking water from sea water is increasingly being considered - but it's a process that happens to be energy intensive.

Similarly, industrial growth continues to accelerate and industrial production requires energy. To continue to power our needs we are undertaking riskier ventures - like deep-ocean drilling and the construction of nuclear power plants and other polluting ventures, like the growing use of coal that produce even greater amounts of carbon emissions.

One interesting thing that the *Limits to Growth* study missed, was the side effects. No one anticipated that carbon emissions would warm the planet as quickly as they have and begin to melt the polar ice caps by 2010. No one imagined that a ½-1 percent rise in the surface temperature of the Gulf of Mexico would result in a significant increase in the number of severe hurricanes. Or, that water would become as valuable as it has in growing areas of drought. And, of course, we have no idea what other side-effects will occur in the future.

The purpose of this Advisor, however, is not to warn of global disaster. It may happen, but it isn't something most of us are able to face on a day-to-day basis, nor is it anything we or our organizations are able to do much to change. We simply need to be aware that there are going to be major changes in the years ahead, that many will probably arise very quickly, and that we and our organizations will need to respond just as quickly if we are to continue to survive and prosper.

In an Advisor in April, I suggested that organizations that understood their processes were in the best position to deal with major changes. Organizations that have defined value chains and that are already good at calculating the costs of each value chain, can apply the same logic to calculating the consumption of fuel, electricity, phosphate, or water. Organizations that know the activities that make up a value chain are well positioned to identify which activities consume specific resources or which activities generate particular emissions. As we advance into this decade and enter the next, this type of information is going to be

critical to organizations that want to survive.

Every company should have an environmental team and that team ought to be working very closely with the organization's business process management team. Indeed, I would suggest merging the two and assigning environmental experts to monitor a variety of key elements for each major process. Waiting till a crisis occurs and you are required to cut water consumption by half, as many organizations in the Southwest United States will be required to do in the next decade or two, is not a good plan. Similarly, waiting until you are asked to quickly reduce the use of some key mineral, which is suddenly in short supply, will also lead to severe problems, unless you have a plan.

One doesn't have to be an environmental pessimist to believe that the coming decade is going to witness lots of very severe disruptions caused by rapidly expanding economies, resource scarcities, and the need to reduce emissions of one kind or another. Then, too, change always brings opportunities and rapid environmental changes will also lead to opportunities for those who can respond quickly to generate effective new solutions.

One key point, however, is that many of the environmental effects we are talking about will probably occur quickly and require major changes in our business processes. Consider the chaos that resulted from the volcanic ash in the skies of Europe last month. (This was not the kind of environmental issue I have been talking about, but it provides a good example of the scale of the problems we may well face and the rapidity with which they can manifest themselves.) If the volcano had been larger - and there have been much larger eruptions in the course of human history - the flights to and from Europe might still be grounded. In that case, many organizations would be thinking hard about alternative means of travel and new business models for industries dependent on air travel. The fact that most of us aren't thinking about this problem (most of us have almost forgotten about last month's problems) suggests that we really expect things to proceed more or less as they have in the past. We like certainty and predictability. We are upset when bad weather delays our flight and we can hardly imagine a situation that would cancel flights for weeks or months. We find it hard to think about major changes that can totally disrupt our lives.

Organizations that understand how they produce their products, that know exactly what resources their processes consume and can pinpoint where substitutions or alterations can be effected, are better positioned to deal with dramatic changes of all kinds. The future is going to demand this kind of agility, and process people, operating at the enterprise level, are best positioned to provide the insight senior executives will need. Setting up such a capability in the next few years ought to be high on the agenda of any organization that hopes to prosper during the decade ahead.

Till next time,

Paul Harmon

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