5 ways 'systems thinking' can jumpstart action

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Network for Bus...
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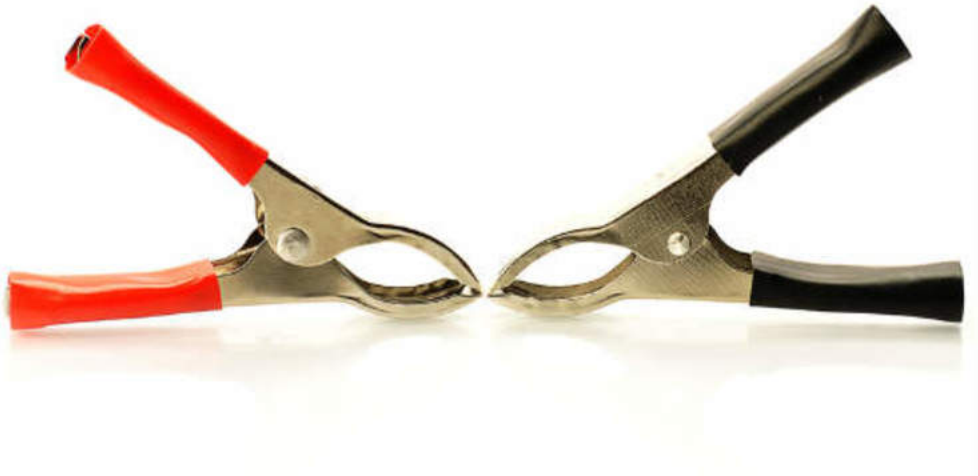

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From climate change and deforestation to collapsing fisheries, species extinction, and poisons in food and water, our society is unsustainable and getting worse fast.

Many advocate that overcoming these problems requires the development of systems thinking. We've long known that we live on a finite "spaceship Earth" in which "there is no away" and "everything is connected to everything else." The challenge lies in moving from slogans about systems to meaningful methods to understand complexity, facilitate individual and organizational learning, and catalyze the changes needed to create a sustainable society in which all can thrive.

Here's how the world operates as a system -- and how businesses can respond effectively to the challenges we face.

The world as a system

Systems thinking helps us understand the structure and dynamics of the complex ways in which we live, from organizational change to climate change, from physiology to financial markets. The structure of systems must be understood broadly, including physical elements (such as the concentration of carbon dioxide in the atmosphere and the time delays in a supply chain), institutions (such as markets and governments), human behavior (such as the way we make decisions) and mental models that shape how we perceive and interpret the world. These elements interact and coevolve to generate the world we experience.

All too often, however, we treat problems in isolation, ignoring the networks of feedback that bind us to one another and to nature. We often blame policy failure on "unanticipated events" and "side effects." Political leaders blame recession on corporate fraud or terrorism. Managers blame bankruptcy on events outside their organizations and beyond their control.

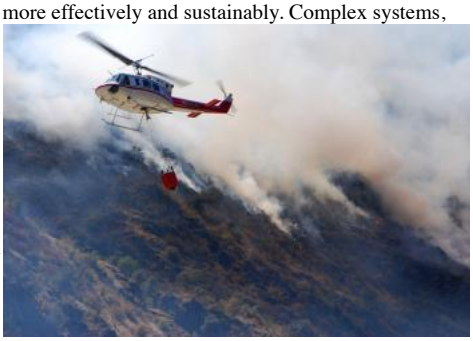
But there are no side effects -- just effects. Those we expected or that prove beneficial we call the main effects and claim credit. Those that undercut our policies and cause harm we claim to be side effects, hoping to excuse our failure. But side effects are not a feature of reality; they are a sign that the boundaries of our mental models are too narrow, and our time horizons too short.

For example, governments in many nations "solve" water shortages for irrigation by subsidizing electricity so farmers can install more powerful pumps. But the short-run success of that policy merely causes the water table to fall faster, requiring still larger pumps and still greater subsidies.

Avoiding such self-defeating interventions, in business and in sustainability, requires us to consider our actions in the context of the broader systems in which we are embedded.

System characteristics

Researchers have identified important characteristics of systems to help us manage them more effectively and sustainably. Complex systems, from an ant colony to a business to a society, are:



• **Governed by feedback:** Our decisions alter the state of the world, causing changes in nature and in the behavior of others, which then feed back to change our own behavior. Cut prices to gain market share and your competitors may respond the same way, leading to a price war. Suppress forest fires and fuel accumulates in the forest, leading to more damaging fires.

• **Subject to delays:** Feedback processes often involve long time delays and accumulations (stocks and flows). Carbon dioxide emissions from fossil fuel combustion accumulate in the atmosphere, causing the world to warm and the climate to change. Emissions are far higher than the rate at which CO2 is removed from the atmosphere. Just as a bathtub continues to fill as long as the flow into the tub from the faucet exceeds

the flow out through the drain, stabilizing emissions will not stabilize the climate. Limiting dangerous climate change before the end of this century requires emissions to fall dramatically, starting now.

• **Nonlinear:** Effect is rarely proportional to cause. Complex systems can cross "tipping points" that cause dramatic and often irreversible changes in their behavior. Take a few fish and fish stocks recover; take too many and the fish stock collapses. Warm the planet enough and greenhouse gas emissions will rise as bacteria convert carbon in melting permafrost into CO2 and methane, further warming the planet in a vicious cycle.

• **Characterized by trade-offs:** Time delays in feedback processes mean that the long-run response of a system to an intervention often differs from its short-run response. Ineffective policies often generate transitory improvement before the problem grows worse, while policies that can create enduring value often cause worse-before-better behavior.

• **Counterintuitive and policy resistant:** In complex systems, cause and effect are distant in time and space, while we tend to look for causes near the events we seek to explain. Our attention is drawn to the symptoms of difficulty rather than the underlying cause. As a result, many seemingly obvious solutions to problems fail or worsen the situation.

These and other principles have implications for the way businesses can become more successful -- and sustainable.

How business can respond

Systems thinking offers these five key lessons for business:

1. Expand the boundaries of our mental models. Most of our current sustainability efforts target symptoms of unsustainability rather than the causes. Our vehicles burn too much oil and generate too much CO2, so we target that symptom with standards to raise the efficiency of new cars. But the resulting reduction in oil demand will lower oil prices, undermining the incentive for people to buy efficient vehicles or cut oil use in other industries.

By expanding the boundaries of our mental models, we can identify the potential for such "policy resistance" and design more effective policies. Raising the price of CO2 will encourage auto companies to design more efficient vehicles and encourage consumers to choose them without the need for complex regulations, while simultaneously offsetting the drop in world oil prices.

2. Recognize constraints. Many of us are overstressed and operate in overstrained organizations. Trying to do too much means we are often unable to marshal the resources we need to kick-start improvements in productivity, quality and sustainability. The result is a self-reinforcing trap of low performance, overstretched resources and failed improvement programs. Firms that succeed in quality and sustainability free up the resources needed to improve by slowing down and focusing on the long-term.

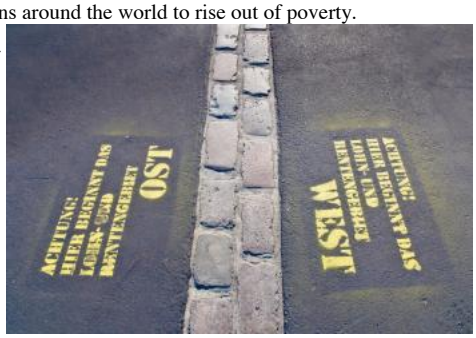
Similarly, we live on a finite world. Therefore, "sustainable growth" is an oxymoron. Striving for perpetual growth while we degrade the carrying capacity of our world is self-defeating. Forward-thinking firms understand that destroying the environment also destroys the possibility of profitable enterprise. They are working to provide products that last longer and offer greater value; to take responsibility for their operations and products over their full lifecycle, including takeback and recycling; and to provide services that support the wellbeing and fulfillment of their customers, instead of simply selling more stuff at lower and lower margins.

3. Move beyond technical solutions. Technology offers hope that we can build a more sustainable world. But market failures limit the efficient allocation of capital and resources, including creativity and innovation. And there are long lags from problem recognition to innovation, commercial viability and scale-up. Technology often generates unintended consequences: For example, taller smokestacks reduce local smog but increase distant acid rain.

Innovation in markets, institutions and governance is essential to realize the full potential of technology. Externalities must be priced. Market failures must be corrected. We can make technology more effective by improving market signals, through regulations that create level playing fields and prevent a race to the environmental bottom, and through monitoring to prevent free riding and unintended consequences.

4. Confront our values. Our guiding values offer the most important leverage point for enduring, sustainable change. Recently, I asked MBA students how much money they needed to be happy. The average response was $2 million per year, and about half said more is always better. Most would accept lower income -- as long as they could make more than everyone else. But obviously endless material growth on a finite world is impossible, and everyone cannot be richer than everyone else, no matter how clever our technology.

Those who are currently affluent must confront the culture of consumption, the conflation of having with being, that is destroying both the environment and human well-being, while supporting the legitimate aspirations of billions around the world to rise out of poverty.



5. Recognize that we can make a difference. People often feel powerless in the face of huge, complex systems. But understanding how systems work helps us to find the high leverage points that make a difference. People often recoil from climate science because they fear that what they do can't possibly matter. But we've created more astonishing change before, from the fall of the Berlin Wall to the peaceful end of apartheid.

The abolition of the slave trade and slavery in England can serve as a model for action on climate change and sustainability: A few committed individuals found the high leverage points and ended an institution that had existed from the dawn of history, that nearly all assumed would always exist.

History shows we *can* do it. But *will* we? That depends on you.

Businesses embracing systems

An increasing number of businesses are developing the systems thinking capabilities of their people and realizing significant benefits. They are bootstrapping steady improvement in quality, productivity and sustainability by reinvesting initial savings in further improvement.

Using systems thinking, a major oil company has generated documented savings of several billion dollars to date, while improving safety and environmental quality. A shipyard went from cost overruns and project delays to an award-winning yard in great demand. A high-tech electronics firm redesigned its supply chain, improving customer service and delivery reliability while cutting inventory. A global automaker built an entirely new service business and is now the market leader in that rapidly growing segment. And a major university implemented maintenance projects that boosted energy efficiency and sustainability while more than paying for themselves, creating resources for still more projects.

Systems thinking can be powerful, but too often remains an abstraction. The challenge for us all is to develop our systems thinking skills, help others develop their capabilities and bring systems thinking into our everyday lives -- to move beyond slogans and on to action.

NBS Thought Leaders offer guidance on sustainable business models for the 21st century. Thought Leaders are leading academics and practitioners: world experts on sustainability issues. Here, Dr. John Sterman, a world leader in the field of system dynamics, identifies key ways that businesses can incorporate systems thinking. Dr. Sterman is a professor at the MIT Sloan School of Management, and has been widely honored for his research and innovative use of interactive simulations in management education and policymaking.

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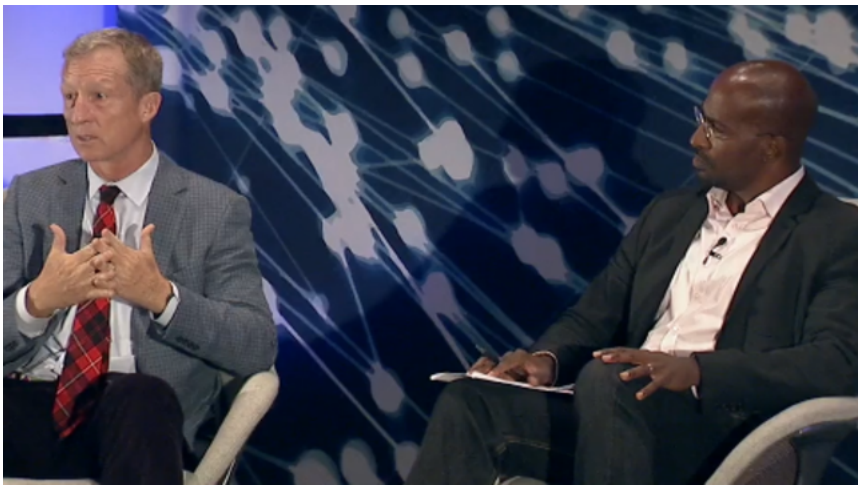

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