The (Needed) New Economics of Abundance

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For centuries, we have built cultures and economies around scarcity. Economics is the "study of how human beings allocate scarce resources"[1] in the most efficient way and conventional wisdom agrees that regulated capitalism results in the most efficient allocation of those scarce resources.

But what happens if resources are not scarce? What economic system would we use to allocate *plentiful* resources? Is there even a point to talking about the "economics of abundance" in a culture where economic equations are entirely oriented around scarcity? As Chris Anderson, editor of *Wired* magazine says, "My college textbook, Gregory Mankiw's otherwise excellent *Principles of Economics*, doesn't mention the word abundance. And for good reason: If you let the scarcity term in most economic equations go to nothing, you get all sorts of divide-by-zero problems. They basically blow up".[2]

We are on the cusp of a new era that has the potential to be an era of abundance. In the coming decades, molecular manufacturing will be a reality. The Nanotechnology Glossary[3] defines molecular manufacturing as "the automated building of products from the bottom up, molecule by molecule, with atomic precision. This will make products that are extremely lightweight, flexible, durable, and potentially very 'smart'", and cheap. Just as Apple enabled personal publishing by marrying the Postscript language with the Macintosh interface and an inexpensive LaserWriter printer, so will the coupling of molecular manufacturing with appropriate programming tools bring about a revolution we might call "personal manufacturing." Such personal nanofactories (PNs) already have been envisioned and are likely to be similar in look and ease of use to a printer or microwave oven. An artist's conception can be seen at http://www.foresight.org/nano/nanofactory.html.

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[1] (2003) The Columbia Electronic Encyclopedia, Sixth Edition, Columbia University Press.

[2] Anderson, Chris (2005) "The Tragically Neglected Economics of Abundance" http://longtail.typepad.com/the_long_tail/2005/03/the_tragically_.html.

[3] (2004) Burgess, Steve; Holister, Paul; Keiper, Adam; Swartz Esq., MPA, Jonathan S.; Wang, Rosa (2004) "Nanotechnology Glossary" http://www.nanotech-now.com/nanotechnology-glossary-N.htm.

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The advent of PNs should bring the cost of most nonfood necessities to near zero. Much of the raw material for most objects we commonly use can be found in air and dirt, with a few fortified materials thrown in. If we build things from the molecules up (and conversely, break things down into their component molecules for reuse), materials cost will nearly disappear. Information would then become the most expensive resource. Meanwhile, computing power—information management—continues to expand exponentially as its cost drops precipitously. Furthermore, as true artificial intelligence (AI) approaches, computers will become self-programming, and information cost may drop even more dramatically. It's already happening. Today, most of our products contain greater and greater information content (technology) at lesser and lesser cost. It appears that even food eventually could be manufactured on the kitchen countertop personal at practically no materials cost.

However, if history is a guide, the "haves" will always want to have more and the "have-nots" will end up getting relatively less. That is the way many people keep score—as the bumper sticker wisdom goes, "He who dies with the most toys wins". It's not just a silly ditty, it is a frank statement of the mindset of many individuals. And it is the "haves" that possess easy access to the levers of power and legislation. In a system based on scarcity, those holding the levers of production will not easily give them up. In domestic and international markets based on scarcity, the function and responsibility of directors and officers is to maximize shareholder value—at nearly any cost that does not fall afoul of laws, or at least not so far afoul that the penalties exceed the financial gain resulting from illegal actions.

So, what kind of culture do we want? In a system of plenty, will we continue to keep score by maintaining the preponderance of benefits inside corporate walls and coffers? Will we continue to stifle the spread of benefits through secrecy and protectionism? Unless something changes, history suggests that laws, regulations, and protections will continue to be designed for the exact purpose of directing all profits and the virtually all of benefits to shareholders.

Is it possible to change this historical trend? Is it desirable? What would an economy based on abundance look like? What would we call it? Could we convince the lawmakers, the regulators, and those who currently benefit most from a system based on scarcity to relinquish what has worked so well for them?

I maintain that it *is* desirable and that we *must* drive toward an outcome whereby the benefits of molecular manufacturing accrue to the greatest number of people. War, poverty, and business drive my reasoning.

To date, all our technological and economic progress has produced a world at war and in poverty. War is largely fought over scarce resources. Widespread wealth (through universal distribution of PNs) would remove the apparent fuel for most wars. [4]

The World Bank estimates that 2.7 billion humans live below a level necessary to meet basic needs. The organization says that this kind of poverty includes hunger, lack of shelter, no access to medicines, and losing a child to illness brought about by unclean water.[5] Few would

[4] Burgess, Steve and Treder, Mike (2005) "Policy Debate" http://crnano.typepad.com/crnblog/2005/05/policy_debate.html.

[5] The World Bank (2006) "Poverty Analysis—Overview" http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPOVERTY/EXTPA/0,,contentMDK:20153855~menuPK:435040~pagePK:148956~piPK:216618~theSitePK:430367,00.html.

argue that human misery is desirable. PNs could be programmed to provide basic building supplies, medicine, foodstuffs, and clean water.

As regards business, I believe we can convince a wide range of enterprises, from local to transnational, that maximizing the benefits for billions of people (read: "customers") simultaneously maximizes value for shareholders...in the long run.

However, nearly all businesses act primarily in the interest of the short term. Corporate directors cannot allow a departure from known short-term profit centers in the market without assistance from legislation and regulators to flatten the playing field for all. Even Bill Ford, chairman of the Ford Motor Company, is calling for government to incentivize his industry to produce environmentally friendly technology[6]—ostensibly so his firm can afford to produce such vehicles while staying competitive with other auto manufacturers.

We must incentivize, strongly encourage, or require the broad sharing of the benefits of early-onset molecular manufacturing advances and breakthroughs so that the long-term benefits can be realized. This discussion needs to happen now, before entrenched interests develop protections and harden regulations adapted for maximum short-term profits while stifling innovation. Market forces can be too slow. What's needed is a means to produce broad and inexpensive licensing so that early breakthroughs in molecular manufacturing can quickly benefit a broad swath of humanity.

Over hundreds of years, we have developed the skills of how to allocate things in short supply. For widespread abundance, we have no experience, no projections, and no economic calculations. Abundance, paradoxically, could be highly disruptive. It is time to design a new economics of abundance, so that abundance can be enjoyed in a society that is prepared for it.

About the author:

Steve Burgess is a contributor to the Center for Responsible Nanotechnology's and Nanotechnology Now's Press Kit and Glossary, both of which are intended to aid in lay understanding of nanotechnology. He is principal of Burgess Consulting & Forensics, a computer forensics and expert witness firm. Burgess was a founder of the data recovery industry circa 1984, and has founded several businesses, including Committed To Memory, an online data storage company. He writes about electronic discovery and nanotechnology.

[6] (2005) "Bill Ford's Address at the National Press Club, Washington, DC", http://www.theautochannel.com/news/2005/11/22/148983.html.