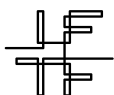




Recent marketplace experiments—from eBay to Interra, from Linux to BIOS—pose surprising challenges to traditional economic practices. They offer new structures for production, new webs of exchange, and new processes of value creation that together form an alternate framework for organizing economic life in society. In the next few decades, these innovations are likely to create a global economic revolution, intersecting with the rise of developing nations and the challenges posed by an increasingly distressed natural environment.



Today's experiments in bottom-up economic systems will transform the global economy over the next several decades



INSTITUTE FOR THE FUTURE

TEN-YEAR FORECAST
PERSPECTIVES 2005

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Grassroots Structures: Building Scale from the Bottom Up

In much the way that limited liability corporations and the founding of stock exchanges defined today's economic ground rules, grassroots economic experiments are creating the structures for a new kind of economy, with new ways of organizing key economic processes:

- **Production:** Open-source practices create a volunteer workforce of millions. Starting in the world of software, this model is now expanding to pharmaceuticals, agro-biotechnology, and media.
- **Distribution:** Peer-to-peer exchanges engage individuals at all levels of the supply chain, allowing them to make their own value and efficiency choices more directly.
- **Property:** Alternate property regimes, based increasingly on the concept of a commons, create new resources for building wealth as well as a new understanding of how to protect a commons.
- **Valuation:** Commons-based systems define a new model for valuing complex ecologies—both natural ecologies such as coastal waters or human-made ecologies such as the Internet—developing business models that can harvest that value without depleting the commons.

Grassroots Accounting: Sustaining Broad Participation

If eBay buyers doubted they would receive their goods, they would never come back as repeat buyers. There would be no Apache or Linux software if coders didn't trust in the system to recognize, value, and make good use

of their contributions. A crucial component of grassroots economies is, in fact, a mechanism for rating the participants in the system.

At eBay buyers rate sellers, establishing a way to identify reputable sellers and secure transactions. Slashdot, a public online knowledge base, uses a rating system to elevate the most relevant articles to the top page of its Web site, providing value to readers and rewarding the efforts of quality contributors. Such experiments with social reputation and rating software point to a new kinds of broad-based, distributed accounting systems.

Grassroots Monitoring: Sharing the Burden of Management

Like any economic system, commons-based systems are subject to gaming, piracy, and free-riding. One well-recognized strategy for avoiding these pitfalls is mutual monitoring, and several bottom-up experiments have developed such monitoring mechanisms.

Wikipedia allows anyone to create, add to, or edit a page in this open online encyclopedia, providing for a rich diversity of expertise, but also exposing it to abusers who could deface pages and destroy credibility. By archiving every revision, alerting volunteers when changes are made, making it easy to restore previous versions, and distributing responsibility for monitoring across the community, Wikipedia has found a formula that greatly reduces monitoring and quality-control costs. Such innovations are benchmarks for emerging practices in the management of grassroots economies.

—Andrea Saveri



Steven reflects on innovations in property regimes—
different ways of structuring property ownership and rights

Q: | We recognize a range for property regimes, from private property to public property to common-pool resources. How does an organization or society know which resources are better managed under different property regimes?

Probably the single biggest lesson here is that there really is no natural state of property rights. Property rights are a social convention. They can move and they can be moved. They're designed by people, for people, and for a set of purposes that can be redesigned.

Most people think they know where their product or industry fits, but you can almost always choose to reallocate resources into a different structure of property rights. I have this conversation with people frequently. They kind of get it, but not in their own industry. In their industry, it has to be a certain way, even technologically determined or somehow determined by nature. There seems to be something about the resource that it must be structured this way. You couldn't possibly have communal ownership over oil fields, for example. But why not? It might not work and might not be economically efficient, but there are a lot of things in the economy that are not economically efficient.

Q: | How do property regimes shape incentives for innovation?

In the pharmaceutical industry people will regularly complain, "Why is the pharmaceutical industry investing in yet another statin drug when we already have five, and yet we're not making enough flu vaccine, not researching malaria vaccine, not spending enough money researching other vaccines?"

The answers to these are clearly tied to the incentive structure that's created by the current property rights regime.

If you're a huge pharma company, here's the sort of thing you're worried about. If you create a drug that is significant for certain public health needs—let's say a cure for cancer, breast cancer—you're going to invest huge amounts of money into the discovery of this drug, and you're going to want to have patent protection on it and sell it at a high price to protect that investment. Choice number one: you invest in a drug for breast cancer knowing full well that if you should succeed, that drug will be compulsorily licensed by Brazil

and China and others who have high rates of breast cancer and would like to sell that drug. Even the United States government might say, well, you can't tell this person who doesn't have health insurance and can't afford \$100 a pill that she can't start her breast cancer treatment. So there is a likelihood that your property rights are going to be infringed in some form or another because it is a great public health need. Choice number two: you have an opportunity to invest those same dollars in a drug that treats baldness or other kinds of lifestyle conditions. Is anyone likely to nationalize that drug on the basis of a public-health argument? So as a big pharma company you're actually safer in investing in drugs that are less essential to human life.

Q: | We're seeing a lot of experimentation now with alternate property regimes, though. Where do you see this experimentation emerging and how is technology shaping it?

Certainly you see it in software, clearly in entertainment content, music, and movies. You're going to start to see it more aggressively around the value chain in pharmaceuticals and almost anywhere where there are significant knowledge components to production or value chains. People are going to start to experiment with elements of shared databases and what we used to call pre-competitive collaboration—the early stages of basic science and knowledge creation. So much of what we know about the way in which ideas and knowledge inputs are generated means that, in many parts of the value chain, it really is dysfunctional to lock things down.

In the 1980s, transaction-cost economics helped people think about the make-or-buy decision. It didn't actually make the decision for them, but it gave them a common language to talk about the decision. There is no such common language yet for the top-down versus bottom-up decision. So what I suspect is that people will experiment and someone will come along with a principle of organization, similar to the principle of transaction-cost economics for the make-or-buy decisions. These experiments will give people a common language for talking about what's at stake when you decide whether to organize from the top down or from the bottom up.



Q: | What are some of the things you need to think about to make that bottom-up or top-down decision? What should leaders look for in their organizations or their industries?

One interesting thing is the nature of the search problem for the knowledge that you need to pull together in order to solve a problem. Suppose I have a small crack in my foundation and I don't know whether it's a serious problem or trivial one, but someone in Berkeley does. My search problem is to find the person who knows how to solve that problem. That's one kind of problem. I don't think open-source solutions are terrifically applicable in those kinds of settings where the answer to the question is already out there and my problem is how do I find the person who has that information and the right credential.

The second kind of problem is this: I'm trying to write an article about property rights in pharmaceuticals, and I have a set of questions that I need to ask about. There is no single person out there that knows the answer to all the questions I have. In fact, there are little bits and pieces of information that I need that are scattered in lots of different places and people and in different forms and in different parts of the world. What I need to do, somehow, is to pull those pieces of information together. And by the way, the valuable information sits in a sea of noise, some of which is irrelevant and some of which is actively wrong. So my search problem is to separate the wheat from the chaff. But it's also to get the pieces of wheat that will fit together to make up the solution. That is a harder search problem, and I think it is something more amenable to open-source solutions, which are very good at getting more distributed pieces of knowledge into a pot and coming up with a peer system of editing them so you can separate the good knowledge from the bad knowledge.

There is a third kind of search problem, in which nobody knows the answer to that question I have and some significant piece of information needs to be created to solve that problem. I don't know whether that kind of problem would benefit from open source.

So the nature of the search problem is one key organizing principle. Another is the nature of the barriers to entry. Are there areas where innovation has become stultified and you want to find ways to actively reduce barriers to entry so others can play? These are also possible candidates for open-source solutions.

Q: | In the last chapter of your book, *The Success of Open Source*, you discuss possible future directions for an open-source method of organizing. Where do you see open-source methods going?

I'm interested in how we value the things that aren't traded in markets—like creativity, community, distribution, health, and well-being. I think the way that technology gets applied to those kinds of things and what people can conceptualize is really quite interesting.

Q: | What is your big hope from this kind of innovative economic thinking for the next 10–15 years?

I think that people, society, companies, and organizations all do better when they are willing to experiment, but change is always fear inducing. The fear instinct that makes you want to close down and protect what you know is probably the most dangerous. I think, for companies, it is really self-defeating because the ecology is open and someone else will come along and eat your lunch. My hope is that people will be open to experimentation and recognize that we're wealthy enough and robust enough to afford mistakes along the way.



Andrea Saveri, Research Director, leads IFTF's work on cooperative technologies and practices.

AN ERA OF ECONOMIC TRANSFORMATION

The 1960s–70s were an era of social transformation, as disempowered members of society—women, ethnic minorities, the disabled, and the gay–lesbian community—challenged such traditional institutions as families, universities, and corporate workplaces. This period of social disruption was followed by a period of technological disruption in the 1980s and 1990s, in which personal computers entered the marketplace with slogans like “the computer for the rest of us” and the Internet laid the groundwork for new kinds of many-to-many communication networks, challenging traditional mass media.

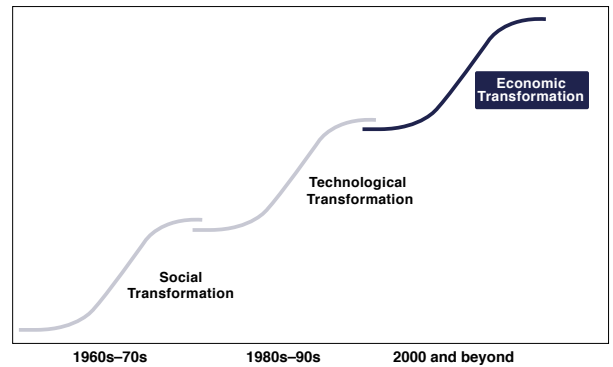
In the coming decades, these two movements will combine to transform the economic landscape. Social networks will be integrated with transactional networks, and a wide range of grassroots economic experiments will use the new technologies to express the values of social equity and commons-based wealth that were keystones of the counterculture movement.

REALLOCATING GDP

One effect of the grassroots economy will be to deflate GDP in certain categories and spur growth in others. In some cases, entire markets that previously generated income may find themselves gutted by open-source, peer-to-peer, or simply free products. In other cases, new categories of products and services, built on a commons, will redefine existing sectors, generating unforeseen wealth.

GDP will not only be reallocated among markets and industry sectors, but also among communities and nations, depending on the availability of bottom–up technologies and personal economic practices. For example, Interra is a citizen-based model of community philanthropy and economic development. The Interra card, which connects cardholders to a network of community members, merchants, and other locally owned organizations, will allow individuals to dedicate a small percentage of their transactions to local organizations—retaining \$10 billion worth of commerce at the local level within five years.

1 Three Eras of Transformation



Source: Institute for the Future

2 World GDP and Consumer Power to Reallocate It

Total world GDP, 2004	\$36.4 trillion
Estimated consumer-controlled share of world GDP	70%

Source: World Bank; Interra.

3 Impact of Open Source on Key Markets

Linux's share of enterprise OS market by 2008 (IDC)	28%
Apache's share of Web-server software market, 2005 (Netcraft)	68.8%
Cost of Apache Web-server market to Microsoft in 2009 (IFTF estimate)	\$16.4 billion
Drop in Microsoft Internet Explorer browser market share, June 2004–Jan 2005 (OneStat.com)	5%
Growth of open source Firefox browser market share, same period (OneStat.com)	5%
5-year CAGR of packaged Linux software (IDC)	44%
How long it would take RIAA to sue 1 out of 10 music file traders (Michaela Stephens, www.theinquirer.net)	2,192 years

ALTERNATIVE PROPERTY REGIMES

The way we organize, share, protect, and create value from resources is influenced by two primary characteristics of the property: its rivalrousness (how much someone's use of it diminishes its availability to others) and its excludability (how easy it is to set up barriers around it). These two dimensions define a set of four key property regimes.

However, the dimensions of rivalrousness and excludability are seldom fixed and innate characteristics of a resource. They can change over time as a result of technology and social innovations—or even redefinition or reuse of the resource in a new context. One of the impacts of grassroots economic experiments is to shift existing perceptions of rivalrousness and excludability to create new, more dynamic ways of thinking about property regimes.

CREATING VALUE ON THE INTERNET COMMONS

The Internet is a new kind of public good, providing many opportunities for creating other public goods and common-pool resources, such as open knowledge repositories like Wikipedia, the Creative Commons for open art and cultural resources, and open-source software. Despite the lack of protective barriers, considerable wealth has been generated from the Internet, as indicated by the market capitalization of eBay, Amazon, and Google. The Internet thus not only serves as a commons for future growth of the grassroots economy, but also as a model for managing other kinds of commons-based resources.

INVESTING IN NATURAL COMMONS

The grassroots economy, with its emphasis on commons-based property regimes, will likely provide innovations in the way society manages and values natural commons, such as oceans, forests, mountain ranges, and gene pools. Robert Costanza, of the Gund Institute for Ecological Economics, prepared a ground-breaking paper published in *Nature* in 1997 that estimated the total net worth of the biosphere at \$33 trillion. He has since updated this work, adding that the original estimate was conservative and that an investment of a \$1 into the preserving intact ecosystems yields a return of \$100.

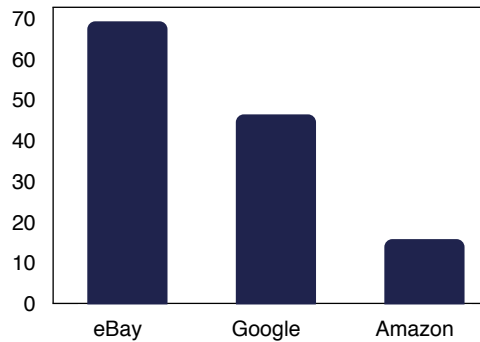
4 Four Basic Property Regimes

	Rivalrous	Non-Rivalrous
Excludable	private good	toll good
Non-Excludable	common-pool resource	public good

Source: Institute for the Future

5 Value Creation on the Internet Commons

Market capitalization, in billions \$US*



* As of November 2004

Source: Yahoo Finance

6 Ecological Goods and Services

	Area (Million hectares)	Total Value (Dollars/ hectare/year)	Global Flow Value (Billion dollars/year)	Global Value (Percent)
Marine	36,302	577	20,949	63
Open ocean	33,200	252	8,381	25
Coastal	3,102	4,052	12,568	38
Terrestrial	15,323	804	12,319	37
Global	51,625	n/a	33,268	100

Source: Robert Costanza et al., "The Value of the World's Ecosystem Services and Natural Capital," *Nature*, 15 May 1997.

UNLOCKING CAPITAL IN THE DEVELOPING WORLD

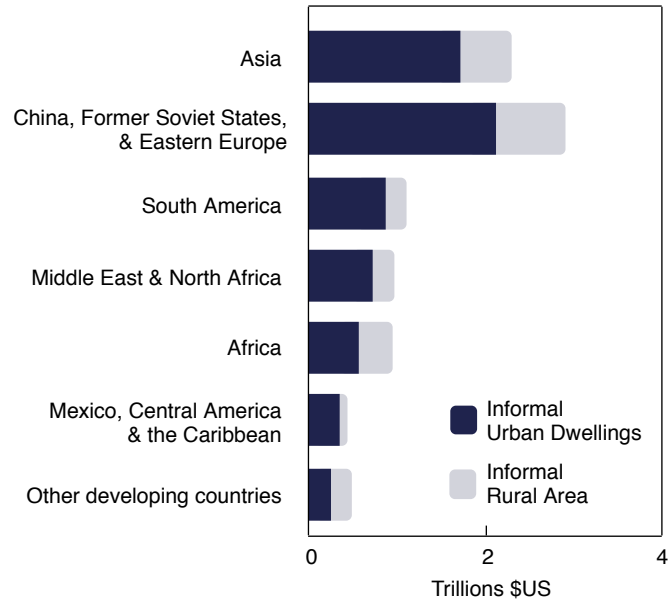
Hernando de Soto, in his book *The Mystery of Capital*, claims that the developing world is disadvantaged in producing capital because the majority of the population lacks access to an efficient and coherent system of property rights that allow so called “dead capital” to be converted into active capital.

Active capital, according to de Soto, is the engine that creates value and wealth. Without access to a formal system that represents ownership of property, the working poor of the developing world are excluded from access to the mechanisms that help capital multiply—such as collateral for loans and mortgages, deeds to secure transactions, documented boundaries to protect investments in land and assets. A change in the ownership structure of assets that would integrate the informal capital sector into the formal one would help millions of micro businesses expand beyond the scope of family and friends and contribute to national wealth.

BOTTOM-UP ADVERTISING: SHIFTING POWER TO PUBLISHERS AND CONSUMERS

A new concept, brewing on Web logs, is flipping the traditional advertising business model upside down. Sell-side advertising advocates pushing decision making about online ad placement down to publishers and readers. Also known as bottom-up advertising, this model suggests releasing ads on the Internet and letting publishers and bloggers select ads for their own sites, which can then be viewed and picked up by other bloggers—thus propagating an advertising meme through social networks or networks of influence (as Ross Mayfield suggests). Bloggers are paid as ads get selected and move through the network. The ads themselves are tagged and can “talk” to their owners (the advertisers) and tell them how they are doing.

7 The Value of Dead Capital in Real Estate



Source: Hernando de Soto, *The Mystery of Capital*, 2000.

8 Alternate Models for Ad Pricing on the Internet

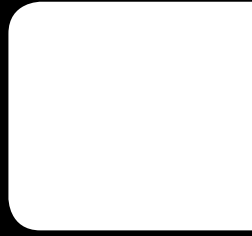
CPM	Cost per 1,000 impressions	Rewards sites for traffic
CPC	Cost per click	Rewards sites for click-through
CPI-1	Cost per influence, 1st degree	Rewards sites for reputation
CPI-2	Cost per influence, 2nd degree	Rewards sites for rewards for reputation

Source: Ross Mayfield, *Many2Many*, July 12, 2004

TECHNOLOGIES OF COOPERATION: THE TOOLS OF THE GRASSROOTS ECONOMY

Technology	Definition	Economic Implications
Self-Organizing Mesh Networks	Devices or nodes in a network that can serve as both receivers and relays or routers, eliminating the need for centralized control	<ul style="list-style-type: none"> • Defines architectural principles for tools and processes that grow from the edges without obvious limits • Enables open spectrum for radio communications • Could support distributed power grids • Supports peer-to-peer digital exchanges
Community Computing Grids	Networks of computation created by volunteers who share excess CPU cycles to produce massive processing power and solve complex problems	<ul style="list-style-type: none"> • Provides structure and resources for problems that require massive computation (e.g., folding@home) • Supports peer-to-peer analysis collectives to solve complex problems such as species extinctions • Enables ensemble forecasting using multiple models for forecasting complex phenomena
Peer Production Networks	Ad hoc, emergent networks of actors who cooperatively create goods or resources without central control or management	<ul style="list-style-type: none"> • Creates a resource commons for diverse open-source development efforts, including software, media, and biotechnology • Promotes distributed innovation and design projects (e.g., MIT's ThinkCycle) • Allows widespread sharing of digital content
Social Mobile Computing	A complex of mobile communication, computing, social-network applications, and aware environments	<ul style="list-style-type: none"> • Enables real-time, real-place, person-to-person commerce • Could drive pervasive-gaming industry • Supports location-based services
Group-Forming Networks	Social-technological networks structured to support many-to-many networks (such as friend-of-a-friend networks)	<ul style="list-style-type: none"> • Multiplies the social and economic value of human-computer networks much faster than television, telephone, or cable networks • Uses affinity groups to create locally meaningful value
Social Software	Tools that make social networks visible, providing metadata about network dynamics, flows, and traffic	<ul style="list-style-type: none"> • Catalyzes social groups that function both as producers and consumers of value • Provides measures of the value of social connections • Builds a platform for automated "syndication" of services
Social-Accounting Systems	Mechanisms for building trust among strangers and reducing the risk of transactions, including rating, referral, and reputation systems	<ul style="list-style-type: none"> • Automates word-of-mouth • Supports broad-based quality control systems for products and services • Adds explicit social-rating schema to invisible market processes
Knowledge Collectives	Emergent online structures and processes for "information hunting and gathering"	<ul style="list-style-type: none"> • Defines an alternative commons-based framework for organizing knowledge work • Enables large, self-correcting knowledge repositories (e.g., Wikipedia) • Creates emergent "folksonomies" instead of top-down taxonomies (e.g., del.icio.us) • Provides effective alternative to expert-refereed publications

Second Life is an online world where players co-create 3D characters, sets, animated film sequences, and the game play itself.



X HEALTH & HEALTH CARE
Develop strategies that treat health as a public good

The new grassroots economy experiments could provide a way to reframe the social dilemma of health care. Today, both employees and employers are losing as health care costs rise: employees are bearing more of the burden of cost, making poorer health care decisions, and getting sick more often, while employers who are caught in the vice of rising health care costs are resorting to drastic measures—such as firing sick employees—in order to keep their costs down.

Clearly a healthier population would be in the interest of everyone. So could health be treated as a commons, with a variety of open-source, peer-to-peer contributions to a healthier herd? After all, medicine is a knowledge-based industry. Furthermore, at least half of human illnesses are the result of behavioral choices. If organizations or communities set up incentives and rewards that seek to build health as a common resource—with peer-to-peer exchanges and open-source tools for feeding that commons—could an alternate framework for managing health emerge?

X MARKETS
Reconsider property regimes and rights to leverage new value structures

Over the next decade, much of value locked into existing property rights is likely to be dispersed by bottom-up social processes—as property that was previously held privately is converted to a commons. The media industry has been the first to feel the impacts of this shift, but pharmaceuticals, agro-biotech, and even education are likely to follow in short order. The cost to continue to protect old property rights in the face of new commons-based experiments may diminish their value to the point of bankrupting companies or whole industries.

A critical strategic choice—and a basic skill set for leaders in the coming decades—will be structuring property

regimes to take advantage of both the commons and private property. Central to this choice will be a deep understanding of the social side of the equation—rather than focusing on individual consumers, companies will need to see social networks as their unit of analysis in evaluating a market and then recognize that these networks are both units of production and units of consumption. They will need to understand how social processes change the way value flows through these networks and how they can use these social processes—or enhance them—to create their own unique value proposition. Finally, as Steven Weber suggests, they will need a new language to talk about the algorithms for success. Every experiment in the grassroots economy helps define this language, and thus bears careful watching.

X COMMUNITIES/POLICY
Look for new sources of local wealth in social processes

Communities have always relied on volunteers and charity to provide many of their services, but these philanthropic efforts have always required organizations to manage and disperse funds. Increasingly, the tools and principles of grassroots economics will provide alternatives for providing some of these services. The Interra experiment is one example.

But in addition to organizing philanthropic and volunteer services in new ways, current experiments in grassroots economics provide an important lesson for communities: social processes are themselves a source a value in any community. Identifying and nurturing these processes, whether through new network tools or simple social practices, is a way to build a commons on which other kinds of wealth—money, knowledge, and culture—can be built.

IFTF is currently investigating each of these themes. Contact Andrea Saveri (asaveri@iftf.org) for more information.