

# CLIMATE CHANGE REFUGEES



The growing displacement of individuals and communities by global climate change will create new identities linked not only to specific climate disasters, but also to the problems that engender climate change. These diasporas will face the same challenges other displaced persons do, but they will differ in two significant ways: the initial cause of migration will be a global phenomenon even when the event itself is local, and the liability will also be seen as global rather than local.

## WHAT TO WATCH

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- New north to south migrations
- The Bangladesh migration
- The Tuvalu pact
- Rural resource disruption
- Grassroots collective disaster response

In *Environmental Refugees: The Case For Recognition*, the London-based New Economics Foundation reports “a growing interdependency in a world where environmental problems have no respect for borders.” According to the report, there will be 150 million environmental refugees by 2050. The result is likely to be continued urbanization, growth of urban squatter slums (which are also more vulnerable to climate change), global competition for specific local resources, and growing ethnic strife as migrants struggle to reinvent themselves in often hostile new environments.

New diaspora identities may emerge in response to specific climate events (such as Hurricane Katrina) or in response to types of climate change impacts (for example, fishermen refugees from fish depleted, flooded coastal zones). In both cases, existing agencies will find themselves struggling to define jurisdictions, while a host of new grassroots organizations, enabled by the Web and distributed donations, will offer platforms for financial support, cross-boundary social policies, and new shared identities.

## FORECASTS:

- The conflict between local experiences and global responsibilities for climate change will create conflicts of identity for those who are displaced
- The volume of climate change refugees will strain existing systems of support (including immigration law) and will likely redefine them. For example, large polluting nations may be required by international agreements to accept internationally defined quotas of climate-displaced people.
- The expanded sense of responsibility for people displaced by global climate change may lead to a redefinition of carbon emission excess (historical and present day) as a “crime against humanity.”

# CLIMATE CHANGE REFUGEES

[http://www.nytimes.com/imagepages/2005/10/02/national/nationalspecial/20051002diaspora\\_graphic.html](http://www.nytimes.com/imagepages/2005/10/02/national/nationalspecial/20051002diaspora_graphic.html)



The applications for FEMA assistance as of 2005 show the geographic range of the Hurricane Katrina diaspora just one month after the storm hit.

The Katrina Information Network is an online platform that uses e-advocacy, grassroots pressure, local action, and selective consumer buying to support the needs of the Katrina diaspora.



<http://www.katrinaaction.org/aboutus>

## OTHER RESOURCES:

### Climate change migration:

[http://news.nationalgeographic.com/news/2005/11/1118\\_051118\\_disaster\\_refugee\\_2.htm](http://news.nationalgeographic.com/news/2005/11/1118_051118_disaster_refugee_2.htm)

### Climate change refugee rights:

<http://news.bbc.co.uk/2/hi/science/nature/3155796.stm>

**A Neesh** "Massive emigration from Bangladesh will have to be absorbed by China and India, the countries struggling with population overload relative to their carrying capacities. Migrations coupled with water shortage may lead to intense negotiations between China and India. Although enormous economic and financial integration between the two countries (by that time) may prevent the chance of conflict, tensions in the region will need to be addressed not just bilaterally but multilaterally. When mass emigration starts moving toward Burma and Northeastern India, the unprecedented humanitarian crisis will need global cooperation, which may or may not emerge."

# INTERNAL DIASPORAS



Rapid urbanization and globalization are driving mass migrations within countries—perhaps the largest migration in human history. The result is the rise of internal diasporas that are using mobile technology to enable new patterns of mobility, new kinds of economic activity, new long-distance relationships, and new kinds of political power.

## WHAT TO WATCH

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- Mass migrations within India and China
- *Solastalgia*
- International guidelines for internally displaced persons

A combination of forces are driving more and more rural people, especially in the rapidly developing nations of China and India, to leave their homes and seek economic—and social—opportunities in cities and suburbs that are under constant construction, changing the very landscape of both rural and urban areas. The unprecedented penetration of cell phones, the proliferation of economic niches in global commercial networks, extreme environmental degradation of some areas, and a desire on the part of young people and women for a new kind of life all add up to new opportunities and new identities for large portions of the population in these countries.

At the same time, the massive migration comes with extreme risks to many—unsafe labor conditions, squatter housing, exposure to toxins, and a whole generation of young children left behind in rural villages while their parents work in the cities. In addition, a new kind of mental distress syndrome—dubbed *solastalgia*—has emerged as people grieve for landscapes that are forever changed by massive construction and environmental change. Responding to these conditions, the international community has moved to provide people who are involuntarily displaced within a country, estimated at 20 million worldwide, with some of the same protections as traditional transnational refugees.

## FORECASTS:

- Identities linked to specific places will break down as people search for new identities that link their daily experiences to their expectations of future opportunities—not only in cities but also in the global economy.
- Shared online experiences will provide a platform for new identity development among internal diasporas.
- More internal migrants will identify with the larger community of transnational refugees—and expect similar rights.

# INTERNAL DIASPORAS

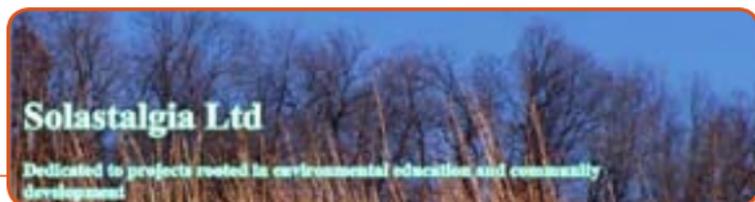
Source: IFTF, 2008



Massive construction throughout China and India are transforming familiar landscapes, both urban and rural,

into “new places”—effectively turning most of the population into a new kind of immigrant.

Solastalgia Ltd. is a nascent non-profit organization that seeks to bring diverse projects together to address the causes and effects of *solastalgia*—defined as the distress caused by the lived experience of the transformation of one’s home and sense of belonging, experienced as a feeling of desolation about its change.



<http://www.solastalgia.org/about.html>

## OTHER RESOURCES:

### **Solastalgia:**

Glenn Albrecht, “Solastalgia: A New Concept in Human Health and Identity,” PAN: Philosophy, Activism, Nature, Volume 3, 2005, pp 41-55.

### **International Guidelines on Internal Displacement:**

[http://www.reliefweb.int/ocha\\_ol/pub/idp\\_gp/idp.html](http://www.reliefweb.int/ocha_ol/pub/idp_gp/idp.html)

<http://www.brookings.edu/fp/projects/idp/articles/guiding.htm>

**Glenn Albrecht** “The diagnosis of solastalgia is based on the recognition of the distress within an individual or a community about the loss of ‘endemic sense of place’ and the loss of a sense of control of its destiny. The positive prescription for solastalgia is personal and community involvement in the protection, restoration and rehabilitation of their place/ bioregion/‘country’ and the return of an endemic sense of place in both individuals and communities.”

# VIRTUAL DIAPORAS



As virtual worlds proliferate—from alternate reality games to social networking sites to blogging and microblogging platforms—users are migrating from one platform to another, often managing multiple identities across multiple platforms.



The resulting diasporas are sources of new value creation in both the virtual and physical worlds.



## WHAT TO WATCH

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- Open ID platforms
- Virtual world workers and consumers
- Persistent avatars
- Virtual citizenship organizations

In the past few years, virtual worlds have emerged as very real economies. The now-famous Anshe Chung Studios is a global multimillion dollar business that started in *Second Life* and is “here to help you, as an individual, organization or brand, to reincarnate and reinvent yourself in the Metaverse.” Meanwhile, platforms like Facebook not only serve as launching pads for musicians, artists, and consultants; they also provide an identity management infrastructure for a host of other applications that link to them. Online platforms can even provide identity services for real-world migrants, effectively granting them a pan-regional “citizenship.”

Because these platforms are rapidly evolving, they effectively create virtual diasporas: communities of people who have inhabited one world and are now shifting to a new world. As people move from platform to platform, a principle task is managing their identities and keeping their connections to others. A host of new identity management “solutions” are on the horizon—from open ID systems that allow users to manage their online presence from a single identity to persistent avatars that give them a virtual “ethnicity” based on their virtual world of origin.

## FORECASTS:

- Migrants from one virtual world to another will increasingly bring value from those worlds—in the form of virtual goods, social and economic relationships, and virtual life skills—all of which will be leveraged in new virtual spaces both by migrants and their new host worlds.
- New meta-services will evolve to help people manage their virtual identities—and the value associated with them—across platforms and even between virtual and physical spaces.
- Increasingly, these diasporas will evolve civic identities that transcend their identities as consumers and laborers in the Metaverse.

# VIRTUAL DISAPORAS

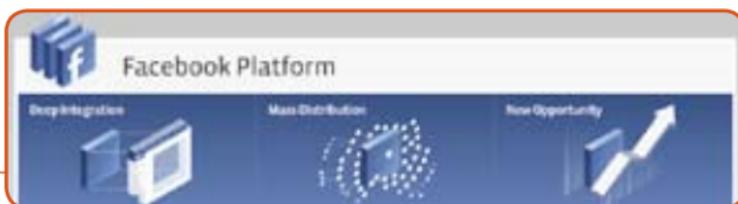
<http://openid.net/>



OpenID helps online users manage their identity (or identities) across multiple online sites, from virtual worlds to commercial sites.

Facebook developers can take advantage of the Facebook diaspora—24 million active users—by creating applications that integrate the social networks and individual identities embedded in Facebook into diverse activities, from media exchanges to political organizing.

<http://developers.facebook.com/>



## OTHER RESOURCES:

### Virtual citizenship organizations:

[www.wcas.northwestern.edu/lacs/rockefeller/documents/Stephen.pdf](http://www.wcas.northwestern.edu/lacs/rockefeller/documents/Stephen.pdf)

### Other open identity tools:

<http://oauth.net/>

### Persistent avatars:

<http://www.metacafe.com/watch/427723/zweitgeist/>

**Lyn Jeffery** “More people are migrating to virtual environments for employment. We’re probably just at the tip of the iceberg here, and will see significant increases in the kinds of work being done and the number of positions available, over the next decade. Some jobs offer opportunities for artist entrepreneurs to produce virtual goods and market them to passionate fans, such as designs for objects in *Second Life*. Other employment looks closer to small-scale sweatshop labor, such as “gold farming” in China and Mexico.”

# MEDIA DIASPORA



As new media channels proliferate on the Web—and as social networking and personal preference tracking are integrated into these new media platforms—people will leverage these “taste trails” to create new identities. Shared tastes plus shared platform histories will create distinctive segments of media users and producers.

## WHAT TO WATCH

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- Taste trails
- Social taste networks
- Collaborative media platforms

Last.FM is not just another way to listen to music on the Web. Nor is it just a convenient way to filter music based on what you’ve been listening to recently. Last.FM is an identity platform and a social networking platform. And it’s just the beginning of a new category of online platforms that will ultimately create an unending stream of new media diasporas: people who are linked by their experiences of creating and sharing rich media online.

At the heart of these diasporas will be taste trails—personal patterns of media consumption, such as music, art, and news, that will increasingly catalyze new identities and communities. Last.FM not only allows users to track their listening habits, but it also pairs users with similar tastes, creating a community of users who can discover new music through the tastes of others. What people listen to defines who they are in these communities, encouraging them to band together on the basis of their taste trails—and in many cases, to create new media collaboratively.

## FORECASTS:

- Open-source sites for rich media collaboration will leverage taste trails to connect artists and foster collaboration—which, in turn, will lead to new media that have ready-made audiences among the social networks of the collaborators.
- Some online users will likely manage their taste trails explicitly as a way of managing their personal identities in online spaces—deliberately creating different personas for different media and different publics.

# MEDIA DIASPORA

## Recently Listened Tracks [\(see more\)](#)

	now listening
	just listened
	6 minutes ago
	15 minutes ago
	18 minutes ago
	20 minutes ago
	23 minutes ago
	25 minutes ago
	21 minutes ago
	26 minutes ago
	27 minutes ago

## Upload your music and reach over 20 million fans for free.



**A unique player**  
To play your music and videos directly to the right ears and eyes.



**A huge fan network**  
To help you promote your music.



**Event management**  
To help widen your live audience.



**Exclusive stats**  
To track your progress, both weekly and in real time.



**A Royalty Program**  
To get paid when your music is streamed.

last.fm the social music revolution

## My Radio [\(show all 2\)](#)



Play Uggah\_Aggah's  
**Radio Station**

Including: The Gossip, Olli Schulz & der Hund Marie, Tegan and Sara, Shout Out Louds, mia, Maximo Park and more

Last.FM is a personalized internet radio platform that artists can use to leverage taste trails and social networks to build a following for their music—and that listeners can leverage to create public identities linked to their musical preferences.

## OTHER RESOURCES:

### More Web 2.0 music platforms:

<http://www.pandora.com/>

<http://pandorafm.real-ity.com/login.php>

### Collaborative open-source media:

<http://www.kaltura.com/index.php/corp/company>

Jess Hemerly “Because artists can use their MySpace pages as a one-stop introduction to what they’re all about, and because of the built-in networking capabilities, MySpace and other tools like it are tearing down the barriers between musicians. An artist with a MySpace presence can see who other artists are listening to, interested in, or working with and contact those artists for everything from touring together to working on a side project ... We’re likely to see more and more of these kinds of collaborations rising outside of the major label system, enabled by social networking technology specific to music.”

# ACTIVIST DIASPORAS



Communication technologies, increasing migration, and socio-political issues that cross national borders are spurring new forms of transnational civic engagement from the bottom up—much of it supported by online platforms that identify people with common views and leverage their social networks to address social, economic, political, and environmental issues.

## WHAT TO WATCH

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- Cross-NGO networks
- Global campaigns for local issues
- Remote monitoring of local issues
- Diasporas of trauma

Over the past 40 years, a proliferation of non-governmental organizations (NGOs) has filled the gaps between government programs and market mechanisms for meeting human and environmental needs. These NGOs have evolved into networks of people and organizations that share strategies, time, and money across issue areas, organizational boundaries, and nation-states. In effect, they have created activist diasporas who leverage far-flung social networks to create new value for society.

Like many diasporas, these activist networks tend to work across traditional geographic and institutional borders. The result? Local issues are increasingly addressed in global forums—and are seen to have global impacts. Seeing the U.S. presidential election as a global issue, citizens in the United Kingdom mount a letter-writing campaign to voters in an Ohio county. Recognizing the influence of dispersed citizens, local candidates for small nations spend much of their campaigning time and money in diaspora communities in large global cities. Amnesty International allows the world to “watch over” Darfur by setting up high-resolution satellite imaging to provide ongoing evidence of atrocities, engaging activists worldwide in the human rights campaign.

## FORECASTS:

- Even as localism gains momentum as a strategy for dealing with climate change and the excesses of globalization, global activist diasporas will take local issues to remote forums—sometimes turning them into global issues.
- Activist diasporas will become increasingly efficient at rapidly mobilizing public opinion and channeling money to address local minority issues—fueling “local minority, global majority” sentiments.

# ACTIVIST DIASPORAS

[http://guardian.assets.digivault.co.uk/clark\\_county/](http://guardian.assets.digivault.co.uk/clark_county/)

**Guardian**  
Unlimited

**G2**

## Operation **Clark County**

In the 2004 U.S. presidential election, The Guardian, a U.K. newspaper, mounted a letter-writing campaign from U.K. citizens to voters in Clark County, Ohio—a county identified as a swing county in a swing state.

Wal-Mart Watch exemplifies the new type of NGO that leverages diverse networks of activist organizations to address a variety of issues in one specific context: the activities of Wal-Mart.



<http://walmartwatch.com/pages/networks/>



**WAL\*MARTWATCH**

## OTHER RESOURCES:

### Remote monitoring:

<http://www.eyesondarfur.org/>

### Diasporas of trauma:

<http://liberiatr.cmnadvocates.org/>

**Michel Laguerre** "New diasporas, through the NGOs they support, have become the new watchdogs of the local government. They do so by lobbying foreign governments on behalf of the homeland government; by pressuring international organizations (World Bank, IFM, etc.) to censor foreign dictators; by forcing local governments to uphold democracy and human rights; and by networking with human rights organizations to force local governments to liberate from jails political activists."

# CORPORATE DIASPORA



Transnational corporations have functioned as global diasporas for several decades, creating employee identities that transcend local and national governments as they move from assignment to assignment. What's new about these diasporas is that they are organizing outside of corporations, they are leveraging their relationships to relocate in specific regions, and they are explicitly using social networking tools to graph themselves.

## WHAT TO WATCH

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- Enterprise social networking platforms
- Hyper-geographic identities

Some years ago in Silicon Valley, observers noted that the vitality of the region arose from the dynamic networks of people who moved from company to company, keeping their “rolodexes” at the ready to tap their networks of fellow alumni. This led many large corporations to set up alumni networks of people who had left the company. Today, enterprise social networking software helps those companies graph and tap such networks. At the same time, bottom-up tools allow ex-employees or wannabe employees to create their own networks. Platforms like Linked In and Facebook are repurposed to coordinate events for people who are looking for jobs in a particular company or people who have been there and want to build on their joint experience to do the “next big thing.”

These corporate diasporic identities are shifting geographic identities as young workers, in particular, maintain daily relationships with people in cities all over the world. This hyper-geographic identity is captured in the recent AT&T advertising campaign featuring a young man who has so many friends in so many places that he really lives in Philawarepragacago: an amalgam of Philadelphia, Delaware, Prague, and Chicago.

## FORECASTS:

- Young workers, especially in developing regions, will increasingly see their careers in terms of stepping stones from one corporate diaspora to another—and will use social software to find the best paths through these diasporas.
- Corporations will compete as cultural destinations to attract workers in the experience economy.

# CORPORATE DIASPORA

## Apple Alumni Association

<http://www.apple.com/alumni.com/>

The Apple Alumni Association is a nonprofit organization with no official ties to Apple Computer, Inc.



IBM maintains its own official alumni network, using Select Minds enterprise social networking software.

<https://www.ibm.com/connection.com/jsp/Front/login.jsp>



<http://www.selectminds.com/jsp/Front/Main.jsp?cmd=resource&page=home.shtml>

SelectMinds supports large corporations in cultivating complex networks across their organizations and beyond organizational boundaries—so that companies can now “manage” people who no longer work for them.

**Gregg Zachary** “Whether “brain drain” or “brain circulation,” the exit of talented people from their home countries into the global marketplace remains a major challenge to national societies, cultures, and governments.”

# BIOMETRIC DIASPORAS



The ability to track, measure, imagine, and express invisible biometric indicators will catalyze active new identities and communities. Perhaps the most controversial of the new diasporas, these communities will confront issues such as the standardization of biometric data, the openness of biometric databases and systems, and voluntary versus involuntary participation in biometric diasporas.

## WHAT TO WATCH

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- DNA-based customs and flight check-in
- Medical ID implants
- Health care map mashups
- DNA-based ancestry tracking
- DNA asylum

Biometric systems will increasingly be used for tagging people, and several groups will form the forefront of the biometric diaspora:

- Global travelers, who will provide biometric data as they cross borders or take up extended stays in foreign countries.
- The ill, whose medical conditions will require verification and monitoring, and whose machine partners will extend their lives.
- Extreme athletes and the military, who will embrace biometric tools that allow them to better monitor and control their physical performance.
- The incarcerated, who will have to submit to increased biometric surveillance.

Biometric systems will link people to geographic places—creating new maps of populations and their movements, from patterns of border crossings and long-term migration to health and disease maps. But they will also create new communities of people who share a common biometric profile, whether it's a shared genetic disease or a shared ancestry in the recent or distant past.

## FORECASTS:

- Biometric tagging may facilitate a freer flow of migrant labor among willing nations, such as the European Union.
- Biometric diasporas will gradually reconfigure social groups based on invisible body-based identities rather than visible ethnic or race-based identities.
- The increasing mobility of humans will be as closely monitored as the movement of capital—and the two may be empirically linked.

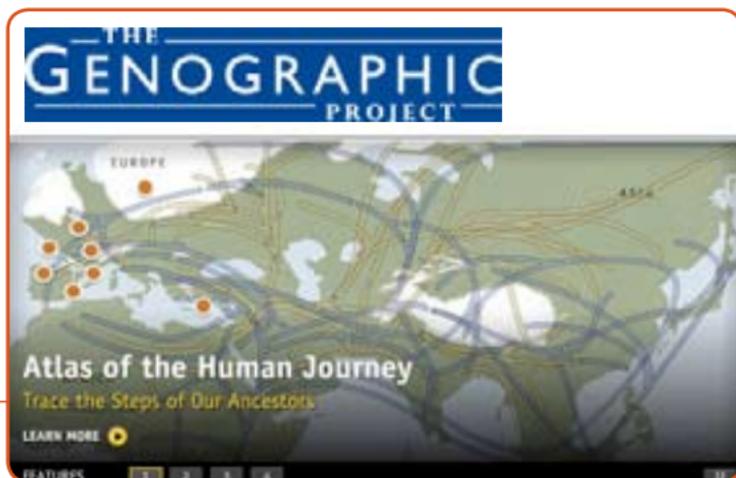
# BIOMETRIC DIASPORAS

<http://www.bio-key.com/fingerprintbiometrics/products.asp>



Bio-key International is one of several companies offering biometric interfaces to provide secure access to Web applications. The use of such applications will begin to define new online diasporas.

The Genographic Project by National Geographic is mapping humanity's historical migrations—and creating new diasporas based on ancestral DNA.



<https://www3.nationalgeographic.com/genographic/?fs=www3.nationalgeographic.com&fs=www5.nationalgeographic.com>

## OTHER RESOURCES:

### Privacy and human rights issues:

<http://www.eff.org/wp/biometrics-whos-watching-you>

### DNA-based geneology:

<http://www.familytreedna.com/public/Buchanan/index.aspx>

<http://www.dnaancestryproject.com/>

### DNA-based asylum:

<http://www.govtech.com/gt/100639>

**A Neesh** “Greater transnational mobility will give rise to the need for greater surveillance and extensive biometric tracking of individuals. Passports will be coded with not only biometric information but also perhaps with GPS chips or satellite tags ... The threat of terrorism will be used to justify this transnational dynamic database of identity by participating nations.”

# NEW WAYS TO MANAGE RISK



Western hedge funds, large pension funds, and venture capital firms are seeking new avenues for both better returns and methods of mitigating investor risk. Many are turning to Islamic banking firms and instruments in search of new, more secure ways to invest in emerging markets. Whether new Islamic instruments prove to mitigate risk will depend on whether they are compliant in substance or in form only.

## WHAT TO WATCH

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- *Takaful* and micro-*takaful*
- Shariah-compliant investment funds
- Islamic banking confederations

Islamic investment is guided by Islam's canonical law known as *Shariah*. *Shariah* has two prohibitions that shape the kind of investment Muslims can make. The first is a prohibition against *Riba* or interest: because money is seen as a measure and not an asset, Muslims cannot invest in money. The second prohibition is against *Gharar*—or uncertainty, which limits the ability to invest in things like insurance and derivatives like futures and options.

To address these issues, Islamic finance has defined a number of new instruments that avoid both interest and uncertainty—at least in principle:

- *Sukuk* is an instrument that invests in assets; the return is taken as rent that is spread evenly over the rental period. The underlying asset provides more security for investors.
- *Takaful* is a form of cooperative mutual insurance in which policyholders pay subscriptions to help those in need of assistance, with losses and liabilities spread across the pool of policy holders and a guiding principle that no one derives advantage at a cost to others.

## FORECASTS:

- *Sukuk* and *takaful* may provide alternative modes of investment beyond the Muslim community for people seeking investments that are both more secure and have a higher return—but banking innovations that place form over substance may undermine this trend.
- The growth of Islamic banking confederations may present a number of advantages that help address both scale and liquidity problems and even the playing field between conventional and Islamic banks.

# NEW WAYS TO MANAGE RISK



www.shariahfund.com

Barclays Capital and *Shariah Capital* announced an alternative investment platform last year that “is targeted both to hedge fund managers ... who are looking for absolute returns and the lower volatility generally provided by alternative investments—all available within a total *Shariah-compliant* framework.”

Hajah Rohani Hj Mohd Shahir is the author of the first Islamic financial planning book in Malaysia, which is the leading center of innovation in Islamic finance. The book is titled *Cukup Wang Hati Tenang*.



www.sph.com.sg/news/latest/pdf/  
ProfileSpeakers-English.pdf

## OTHER RESOURCES:

### Islamic finance and conventional banking:

[http://www.gulfinthemediamedia.com/files/article\\_en/336822.pdf](http://www.gulfinthemediamedia.com/files/article_en/336822.pdf)

### Islamic banking confederates:

<http://www.continuitycentral.com/feature0126.htm>

[http://www.mckinseyquarterly.com/article\\_page.aspx?ar=1694&l2=7&l3=10](http://www.mckinseyquarterly.com/article_page.aspx?ar=1694&l2=7&l3=10)

**Dave Gutelius** “A new range of investment vehicles that help banks cover liquidity requirements at higher return and help banks and other investors manage risk more effectively will make Islamic banking increasingly attractive—and influential in global markets.”

# NEW FINANCIAL PRODUCTS



Seeking to grow market share, Islamic banks will innovate in two ways: they will develop new offerings for their traditional Islamic customers and they will also offer attractive, competitive products for the non-Islamic world. These offerings may find an unexpected market among non-Muslims who are seeking an alternative ethical framework for investment.

## WHAT TO WATCH

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- New kinds of credit cards
- Convertible *sukuk*
- *Shariah*-compliant mortgages

Islamic banks are continuing to innovate the kinds of financial products they offer to Islamic customers—from *Shariah*-compliant credit cards to mortgages in which an intermediary buys the property and then rents it to the eventual buyer. At the same time, however, much of the growth of Islamic banking will come from Western investors. In recent offerings of *sukuk*, European investors accounted for 30-70% of all investors.

Islamic investment instruments may, in fact, become increasingly attractive to investors with specific Western ethical concerns. Islamic banks are likely to link to Western ethical concerns by highlighting prohibitions against investment in alcohol, pornography, gambling, and tobacco, all of which dovetail with socially responsible investment in the West. Islamic banks may also be seen as protecting against the excessive debt that was incurred in the 2007 sub-prime loan market.

The challenge to both Islamic and Western banks offering Islamic investment products is the lack of basic standards for everything from accepted qualifications for key personnel to definitions of vehicles.

## FORECASTS:

- Non-denominational banks based on Islamic principles and ethics will grow in non-Islamic markets, ultimately integrating the Islamic financial practices into the global economy.
- The growth of standards will create a more competitive sector in the near term and remedy the current situation in which key players with better access to information, experts, and market insight profit disproportionately over competitors.

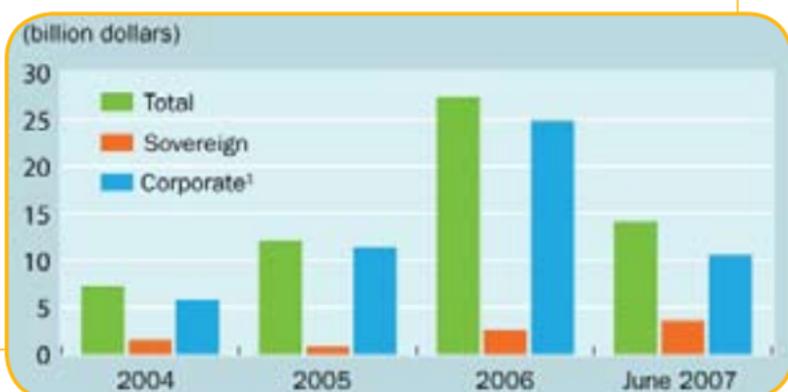
# NEW FINANCIAL PRODUCTS



<http://www.ameinfo.com/117625.htm>

In April 2007, the First Gulf Bank issued the Makkah Credit Card with *Shariah*-compliant payment methods, a *takaful* insurance plan, and the “opportunity to earn ‘Steps’ to travel to the Holy City of Makkah.”

The issuance of Islamic securities grew to over 27 billion by mid-2007, compared to 7.2 billion in 2004.



Source: Islamic Finance Information Service  
<http://www.imf.org/>

## OTHER RESOURCES:

### Innovation in Islamic finance:

<http://archive.gulfnews.com/articles/07/06/02/10129272.html>

### Convertible *sukuk*:

<http://www.zawya.com/Story.cfm?id=ZAWYA20070827123257&page name=sukukmoni>.

### Islamic mortgages:

<http://news.bbc.co.uk/1/hi/business/4725459.stm>

**Ethan Chorin** “Many speculate this cross-pollination will have a liberalizing effect on both the Arab/Muslim world and policy-makers in the West, in as far as each side needs to understand—relatively deeply—the religious, cultural, and commercial logic of the other in order to participate in this space.”

# NEW BANKING METROPOLES



The growth of Islamic finance is redrawing the map of global financial centers—with several cities emerging as Islamic banking metropolises.



These cities are likely to become the hubs in a network of financial innovation—as well as cultural exchange and global economic leadership.

## WHAT TO WATCH

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- Expansion of Islamic centers in Southeast Asia
- The role of London as an Islamic financial hub in the West
- Key non-Muslim, non-Western centers of Islamic finance

In just a short time, Kuala Lumpur, Malaysia, has become the leading center for Islamic finance, managing investments from around the globe and increasingly taking the lead in infrastructure development in emerging economies. Malaysia's success has been due, in part, to early modifications to its regulatory environment to attract foreign Islamic investments.

There is a scramble among other Islamic nations—and non-Islamic nations—to reproduce Malaysia's success. In Southeast Asia, Indonesia still trails far behind Malaysia, with only one-tenth of the assets as its smaller neighbor, but many believe it has the potential to attract not only local money, but also petrodollars and *Shariah*-compliant funds from the Middle East. Similarly, India has demonstrated that there are substantial investment opportunities for *halal* banking. The number of *shariah*-compliant stocks and companies in India is actually greater than most Islamic countries, and the more robust banking laws make India very attractive.

Meanwhile, in the West, London has taken the lead in Islamic finance. London has political advantages over banks in New York, which do not have the broad support of the U.S. government for developing Islamic markets.

## FORECASTS:

- Financial centers have always served as magnets for business and cultural innovations—and the new Islamic banking metropolises are likely to define a new pan-regional culture of innovation rooted, at least in part, in Islamic values
- Islamic financial centers in non-Islamic nations will also become cultural hubs for the global Islamic diaspora—creating a more global voice for Islam.
- Islamic financial centers in both the East and West are likely to be key players in the future development of emerging economies, especially in Africa.

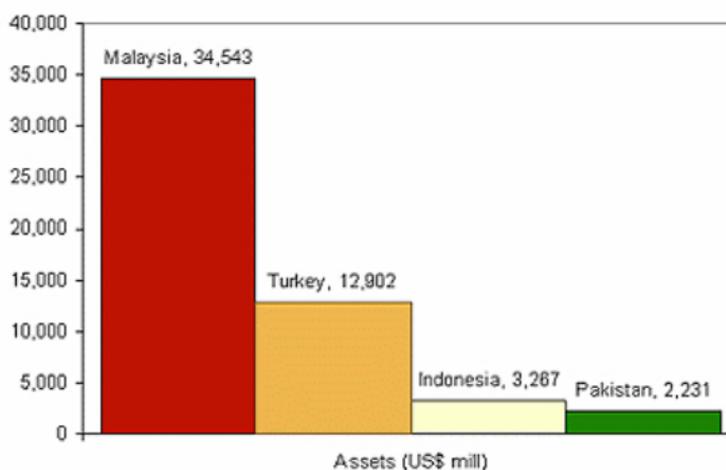
# NEW BANKING METROPOLES

Source: IFTF



Many of the leading centers of innovation in Islamic banking are outside the Gulf States, which tend to have stricter interpretations of Islamic law.

Malaysia leads its competitors in assets held in Islamic financial instruments.



<http://www.dinarstandard.com/finance/IFComparison0308.htm>

**Neeta Thakur** "Over the last decade, Islamic banking has grown at an average annual rate of 15%. Islamic banking has permeated many conventional western financial systems and more than 300 Islamic financial institutions are present today in over 51 countries ... Depending on the country, this entry by the Islamic financial institutions may be in different stages: an initial stage where selected Islamic products are offered, a second stage where full-fledged Islamic banks are allowed to operate, and a third stage where non-banks develop and expand the range of Islamic financial products available."

# ISLAMIC LEGAL & RELIGIOUS DEBATE



Islamic finance is rooted in Islamic canonical law: *Shariah*. As a result, innovations in Islamic financial instruments and practices are subject to the often clashing interpretations of Islamic law. A current proliferation of reform scholars, including those who are revisiting the rights of women, may well shape the future of Islamic banking and even Islam's role in the global economy.

## WHAT TO WATCH

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- Gender debates in Islamic law
- Islamic reform scholars

The Islamic financial world is divided into two main sects: the Suni and Shiia; the Suni divide themselves further into at least five traditions that are loosely associated with different regions. This sets the context for geographically distinct interpretations—and practices.

Beyond traditional differences in interpretation, regional incentives to grow financial leadership will likely produce further debate. The basic underlying conflict in these debates will be this: does a financial innovation technically follow the form of a law but effectively transgress the spirit of that law? Making this call is difficult because most of the laws were formalized before the advent of modern financial institutions.

Examples of interpretive clashes include:

- the legitimacy of credit cards, which might lead to situations of personal debt beyond the limit of *Shariah* compliance
- the extent of interest that's prohibited—whether it's entirely prohibited or only prohibited when the interest rates become burdensome
- the high interest rates of micro-finance systems

Often interest payments can be hidden away as administrative fees or guarantees, but this reshuffling comes at the cost of potential public outcry.

## FORECASTS:

- Southeast Asia will continue to lead in innovation of financial offerings, straining deals and interactions with financial institutions led by Saudi Arabian scholars and lawyers, for instance.
- A growing community of Islamic women scholars—and scholars of Islamic gender issues—will intersect with financial innovations to reinterpret gender norms and create new opportunities for women.

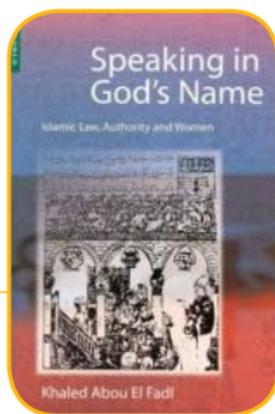
# ISLAMIC LEGAL & RELIGIOUS DEBATE

## The Geography of Islamic Belief

Sunnī Islam	
Malachi	North and West Africa, Andalusia
Shafi	East Africa, Malaysia
Hanbali	Gulf and Saudi Peninsula
Hanafi	Old Ottoman Empire
Salafi	More recent, fundamentalist
Shia Islam	
	Iran, Iraq, Southern Lebanon

Source: IFTF

Khaled Abou El Fadl, who has been described as “the academic voice of the world’s majority-moderate Muslims,” looks at the long-standing ethics of Islamic law—and their specific application to women.



Source: <http://Scholarofthehouse.org/abdrabelfad.html>

## OTHER RESOURCES:

### Islamic finance and women:

<http://www.zawya.com/Story.cfm/sidFFT107183FA560666>

### Islamic law and finance:

<http://www.law.com/jsp/ihc/PubArticleIHC.jsp?id=1178096675132>

[http://legaltimes.typepad.com/blt/2007/05/islamic\\_finance.html](http://legaltimes.typepad.com/blt/2007/05/islamic_finance.html)

**Neeta Thakur** “Different scholars may have different views on interpretation of *Shariah*. What may be considered *Shariah*-compliant in Malaysia may not be *Shariah*-compliant in the Gulf. While Islamic finance is defined by these differences, and always has been, the growth of the industry is putting more strain on them. For now, this makes it difficult to structure cross-border deals or develop financial products that can sell across Islamic markets.”

# DEMAND FOR ISLAMIC FINANCIAL KNOW-HOW



Islamic finance has grown so rapidly—and is innovating so quickly—that the marketplace is having trouble filling the demand for qualified experts at all levels. Over the next decade, competition among regional markets will be as much about vying for qualified personnel as it is about competing for investors.

## WHAT TO WATCH

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- International certification programs in Islamic finance
- U.K. leadership in Islamic finance programs
- New U.S. training programs

As demand for Islamic financial experts outstrips the supply, more educational institutions are stepping up to provide training in Islamic finance and law. In the short term, however, the situation is likely to exacerbate competition—both for people who are qualified to work in the field and for national standing in the Islamic financial community.

The lack of experts is one of the key gating factors on the growth of Islamic finance. Without people who are qualified to provide Islamic financial services and oversee offerings—indeed, without standards for what constitutes qualified personnel—banks are limited in the services they can offer.

Already there is significant competition across regions, with “brain drain” occurring as Western banks begin to open Islamic windows and can afford to pay more for personnel. Even among non-Western markets, differences in pay scales dictate the flow of experts: Malaysia is facing tough competition for talent from the Gulf nations.

## FORECASTS:

- The United Kingdom will likely take the lead in offering certification programs in Islamic banking and finance—positioning it to skim the cream of the crop for its own institutions.
- Programs in Islamic finance will proliferate in the United States and eventually become integrated into finance and management courses, in general.
- The continued differences in interpretations of Islamic law will further complicate the training and certification of people who are qualified to work in the field—making talent an ongoing barrier to growth.

# DEMAND FOR ISLAMIC FINANCIAL KNOW-HOW

## A Timeline of Islamic Finance Education in the West

- 1991: The Institute for Islamic Banking and Finance was established in London.
- 1995: Harvard University inaugurated the Harvard Islamic Finance Project to develop an interdisciplinary approach to researching Islamic finance; the school does not, however, have an Islamic finance program.
- 2004: Rice University professor Mahmoud El-Gamal served as the first Islamic finance scholar-in-residence at the U.S. Treasury Department.
- 2004: Tufts University Fletcher School of Law and Diplomacy introduced a course on Islamic banking and finance, taught by Ibrahim Warde.
- 2007: Cass Business School, part of the City University of London, launched an executive MBA in conjunction with the Dubai International Finance Center; based in Dubai, it combines instruction in Islamic finance, energy, and general management.

## OTHER RESOURCES:

### Demand for Islamic finance experts:

[http://www.businessweek.com/bschools/content/mar2007/bs20070326\\_092181.htm](http://www.businessweek.com/bschools/content/mar2007/bs20070326_092181.htm)

### Malaysian brain drain:

[http://www.btimes.com.my/Current\\_News/BTIMES/Industries/IslamicFinance/20070927230324/Article/](http://www.btimes.com.my/Current_News/BTIMES/Industries/IslamicFinance/20070927230324/Article/)

**Ethan Chorin** “While increasing numbers of Western business schools are recognizing the need for cadres trained in the cultural norms and jurisprudence relevant to Islamic banking, it is unlikely the full-fledged ‘Islamic’ MBA concept will catch on either within or outside the Islamic world, given the fact that even an ‘Islamic’ MBA program would need to teach the basics of Western finance.”

# NEW DEVELOPMENT ETHICS



The next decade will see a growing assertion of Islamic identity, and with it, growing demands for economic development programs that conform to Islamic ethics. Programs based on loans for development—even microloans—are being challenged as noncompliant. As investors look for ways to promote economic development that meet the needs of Islamic entrepreneurs, they may also be creating an alternative ethical framework for development in general.

## WHAT TO WATCH

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- Islamic micro-credit
- Zero-interest banking
- Islamic infrastructure investment in developing economies

Worldwide, there's a growing demand for new strategies for economic development of the world's poorest people. For the past several decades, most development strategies have focused on large infrastructure projects, such as oil refineries, that required very large-scale investments, primarily by local governments, with the promise of jobs and taxes to recover the costs of the projects.

Many of these projects have not reached their goals but have left emerging nations deeper in debt. A search for alternative capitalist strategies, in some cases linked to an alternative moral order, have led to innovations such as microlending and more recently to experiments with Islamic finance and, in particular, a form of Islamic microlending known as *Mudarabah*—a kind of profit-sharing in which the bank provides funds and the entrepreneur provides expertise, labor, and management. A floating interest rate is pegged to the debtor's profits.

Many of these experiments in economic development address the needs of women, in particular. Here, as in other areas of Islamic finance, the scholarly work of interpreting Islamic law and its application to women, in particular, could lead to further innovation not only in financial instruments but in the practical frameworks for global development.

## FORECASTS:

- Islamic financial centers will play a growing role in international development, leading to new patterns of political and economic alliance.
- New gender-focused interpretations of the Islamic law will favor the growth of Islamic women entrepreneurs in developing economies.
- Zero-interest loans, rooted in the Islamic principle of *Qarze-e-Hasna* (helping someone in need) will target the poorest poor.

# NEW DEVELOPMENT ETHICS



<http://www.akhuwat.org.pk/>

In Pakistan, the non-profit organization Akhuwat provides interest-free loans to the poorest poor, mainly women, in the spirit of helping someone in need, with interest-free loans. The funds are received in small amounts from donors within Pakistan and recycled

through the poor community as loans are paid off. The loan programs include both group-based lending and individual loans, and Akhuwat is actively helping others replicate its model.

**akhuwat**  
poverty alleviation through *interest-free* micro-finance

اخوات

## OTHER RESOURCES:

### Islamic microfinance:

<http://www.dinarstandard.com/finance/MicroFinance111806.htm>

<http://www.pakistantimes.net/2007/09/11/top6.htm>

<http://www.womenforwomen.org/downloads/CHJournalv2.pdf>

### Akhuwat's zero-interest loan model:

<http://ipsnews.net/news.asp?idnews=32041>

**Dave Gutelius** "The expansion of Islamic banking into international development and making funds available to women will have a profound impact on power relations in developing societies. If Islamic banks continue to expand their investment activities, there are implications for not only economic development, but a host of orthogonal areas as well— some of which challenge cultural practice, interpretation of Islamic law, and deployment of power and influence in society."

# NEW MODEL ARMIES



Two new styles of war will drive a new set of military actors over the next decade. First, private military groups, funded by private, non-state supporters, will take on an increasingly important operational role beside traditional armies. Second, both conventional and non-traditional militaries will rely more heavily on drones and other semi-autonomous robots for intelligence, support, and—increasingly—combat operations.

## WHAT TO WATCH

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- Private armed forces
- New defense industries
- Semi-autonomous robot armies
- Super-empowered individuals

The global military activity is clearly no longer the sole province of large national armies. From global guerillas to private military contractors (PMCs) to robots, the next decade will see a proliferation of new kinds of military agents who will change the meaning of warfare, protection, and collateral damage.

Blackwater is only the most visible signal of the rise of private military contractors, the 21st century version of the classic “mercenary” army; today, well over 100,000 PMC employees serve in Iraq in support roles. Many of these organizations have varying allegiance to the interests of national governments, even as they offer states a way to achieve international ends without direct action.

At the same time, robotic “drones,” “packbots” and similar semi-autonomous military platforms have become so commonplace that even guerilla groups have begun to deploy crude drones. As with the Predator unmanned aerial vehicle, many of these robots are likely to shift from purely intelligence and support roles to combat operations. These systems have become “smarter,” as well, with increasing levels of operational autonomy.

## FORECASTS:

- Within 20 years, there will be 10 private military employees for every public military employee.
- Privatization of the U.S. military will lead to increased dependency on private forces and a hollowing out of military capability.
- Private armies will be used for more domestic work, such as disaster relief.

# NEW MODEL ARMIES

<http://www.foreignaffairs.org/20031010fabook82631/peter-singer/corporate-warriors-the-rise-of-the-privatized-military-industry.html>



P.W. Singer, from the Brookings Institution, analyzes the impacts of privatized armies that are bought and sold on Wall Street.

Experimental robots, like the BigDog from Boston Dynamics, simulate the biological intelligence of living systems and point to the next generation of military robots.



[www.bostondynamics.com](http://www.bostondynamics.com)

**Boston Dynamics**



## OTHER RESOURCES:

### Non-human military actors:

[http://en.wikipedia.org/wiki/MQ-1\\_Predator](http://en.wikipedia.org/wiki/MQ-1_Predator)

### Disaster relief as military action:

<http://www.csmonitor.com/2005/0919/p01s01-usmi.html>

[http://www.nytimes.com/2005/01/09/international/worldspecial4/09military.html?\\_r=1&oref=slogin](http://www.nytimes.com/2005/01/09/international/worldspecial4/09military.html?_r=1&oref=slogin)

**Sharon Weinberger** “Now, the largest defense companies are no longer necessarily those that bend metal; rather, the top companies are those that can manage the vast and complex defense projects undertaken by the Pentagon, particularly the IT and information architecture that links these systems together, such as in the Army’s Future Combat Systems. This trend has led to the outsourcing of management responsibilities to private companies, and a decline of management and technical expertise within the military.”

# MEME WARFARE



Memes are self-propagating ideas that spread through a population—or culture—like a virus. But while they are, by definition, self-propagating, a number of strategies have emerged for deliberately planting, propagating, and disrupting memes, from mainstream advertising and counter-culture “subvertising” to the use of new media and even computer code to spread ideas that disrupt the status quo.

## WHAT TO WATCH

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- Culture jamming
- Hactivism
- Graffiti
- Subvertising
- New media

Richard Dawkins coined the term *meme* in 1976, looking for a theory of ideas equivalent to that of natural selection. The concept is particularly relevant in open-source warfare, which has been characterized thus:

“The point of conventional war is, in the words of George Patton ‘not to die for your country, but to make the other poor bastard die for his.’ The point of memetic war is, conversely, to make the ‘other poor bastard’ *unwilling* to ‘die for his.’”

Meme warfare often appropriates mainstream media for bottom-up, distributed “culture jamming”—for example, recasting corporate advertising as anti-corporate “subvertising.” It may also appropriate traditional news media videos, adding text commentary that challenges the main messages of the media.

In its most sophisticated (and scientifically controversial) form, meme warfare posits a mathematics of meme propagation, in which meme complexes link several mutually reinforcing memes together. It’s possible to attack these complexes by attaching “rider” memes some of the weaker or less controversial memes in the complex; these rider memes are designed to subliminally weaken first the meme and then the entire meme complex.

## FORECASTS:

- The techniques of culture jamming and subvertising used by anti-corporate activists will increasingly be adopted by both traditional and open-source military strategists to undermine their enemies’ legitimacy.
- As new media tools become easier to use, the media campaigns of insurgents will become increasingly sophisticated, with staged news feeds that will be difficult to distinguish from professional media from the field.

# MEME WARFARE

<http://www.youtube.com/watch?v=TzcGxNp6Fo&feature=related>

Protesters appropriated mainstream news media reports of the recent protests in

Tibet, providing subtitles with their own commentary—and leading China to shut down YouTube.

China: Tibet and the Hypocrisy of Democracy



“Subvertisements” appropriate corporate logos and advertising styles to target specific brands with specific issues—undermining the power of the brand.



<http://en.wikipedia.org/wiki/Subvertising>

## OTHER RESOURCES:

### Culture Jamming:

<http://www.adbusters.org/home/>

[http://en.wikipedia.org/wiki/Culture\\_jamming](http://en.wikipedia.org/wiki/Culture_jamming)

### Hactivism:

<http://en.wikipedia.org/wiki/Hactivism>

**Sharon Weinberger** “The failure of the United States to communicate effectively to foreign audiences over the course of the global War on Terror has been widely regarded as a key strategy failure ... As a recent Defense Science Board reported noted: ‘We need to move beyond outdated concepts, stale structural models, and institutionally based labels’ ... Despite this realization, many U.S. strategies have been naive or even counterproductive. A number of State Department efforts, for example, have been ridiculed as little more than crass marketing. At the same time, insurgent and terrorist groups have been able to effectively utilize Web sites and media to relay information and propaganda.”

# NETWORK STRATEGIES



Open-source warfare is characterized by several key network-derived strategies: leveraging scale-free networks, using open-source tools and information, and engaging in rapid prototyping. These strategies a constantly evolving battleground—for both combat and non-combat operations.

## WHAT TO WATCH

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- Metaverse “training”
- Swarm war
- Impoverished explosive devices (IEDs)
- “Army of One”

*Scale-free networks* operate on a “power law” model, with a small number of densely connected hubs and a large number of loosely connected nodes. Such networks tend to be very resilient and very effective at rapidly disseminating information—except when a main connector node is removed.

*Open-source* strategies leverage easy access to information and shared building blocks of code, media, or knowledge to stimulate innovation. Applied to warfare, open-source refers to co-creation and sharing of tactical instructions, giving newly formed guerilla groups a ready-made set of tools and attacks.

This pattern of experimentation, reconsideration, and refinement as a name in the world of design: *rapid prototyping*. Here, the goal isn’t to create a perfect model at the outset, but to produce of series of tests of imperfect designs. In warfare, this means both a high rate of attrition for participants in the early phases of tactical design and an ongoing process of learning and redesign. It also tends to support rapidly shifting groups of people using rapidly evolving tools and techniques of disruption.

## FORECASTS

- Because the success of open-source warfare requires some measure of secrecy, flooding the network with false tactics and misinformation will become a viable counter-measure.
- The rapid prototyping model may become more prevalent in the advanced industrial nations with the increased use of semi-autonomous war-fighting technologies such as drones and robots.
- Both “smart mobs” for social change and “dark mobs” for illicit commerce will increasingly take on the non-combat characteristics of open-source warfare groups.

# NETWORK STRATEGIES

[http://en.wikipedia.org/wiki/Improvised\\_explosive\\_device](http://en.wikipedia.org/wiki/Improvised_explosive_device)



Impoverished explosive devices (IEDs) are an example of rapid prototyping in a networked environment: they were initially developed in Iraq, then started appearing in Afghanistan, where they began to take on unique characteristics.

While *Second Life* “griefers” pose as the mostly harmless *Second Life* Liberation Army,” comments by some jihadists have suggested that *Second Life* serves as a meeting ground for extremists and for theoretical training—which could become more tactical in the future as alternate



reality worlds blend more seamlessly with real world locations in what some call the “Metaverse.”

[http://www.timesonline.co.uk/tol/news/world/middle\\_east/article2199193.ece](http://www.timesonline.co.uk/tol/news/world/middle_east/article2199193.ece)

[http://nwn.blogs.com/nwn/2007/02/you\\_and\\_what\\_ar.html](http://nwn.blogs.com/nwn/2007/02/you_and_what_ar.html)

## OTHER RESOURCES:

### Army of One:

<http://www.armedforcesjournal.com/2007/08/2872696>

<http://www.washingtonpost.com/wp-dyn/content/article/2006/05/22/AR2006052201627.html>

**John Robb** “Tinkering networks may become the development arm of terrorists. For example, as biotechnology becomes easier to access, ubiquitous, and increasingly based on the manipulation of information ... tinkering networks will form. These networks are likely to include a subnetwork that develops weaponized biotechnology for sale to terrorists and criminal groups (very much in the same way cyber crime has developed).”

# SYSTEM DISRUPTION



The complex infrastructure of modern society is both its greatest asset and its most vulnerable weakness. Transportation, energy, communication, food, information, even social infrastructures have become increasingly complex and interconnected over the past 50 years—increasing the risk that failure of one component will trigger a cascading system failure. In an open-source warfare era, attacks on global infrastructures are a key threat.

## WHAT TO WATCH

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- Energy infrastructure attacks
- Communications infrastructure attacks
- Effects-based operations (EBO)
- Global climate change as a weapon

System disruption takes advantage of a densely interconnected world, where increased complexity breeds increased vulnerability. As a form of asymmetric warfare, it is enormously powerful—and can have a significant return on investment. According to the Iraqi government, the costs of attacks on Iraqi energy infrastructure in one ten-day period in 2004 ran to over a billion dollars, while the cost required to carry out the attack likely amounted to little more than ten thousand dollars.

In the form of “effects-based warfare,” conventional military forces can also carry out system disruption attacks against urbanized targets, with devastating results. For both asymmetric and conventional militaries, system disruptions offer the dual advantage of being relatively easy and safe to carry out, and having a measurable impact on the quality of life and legitimacy of the opponent.

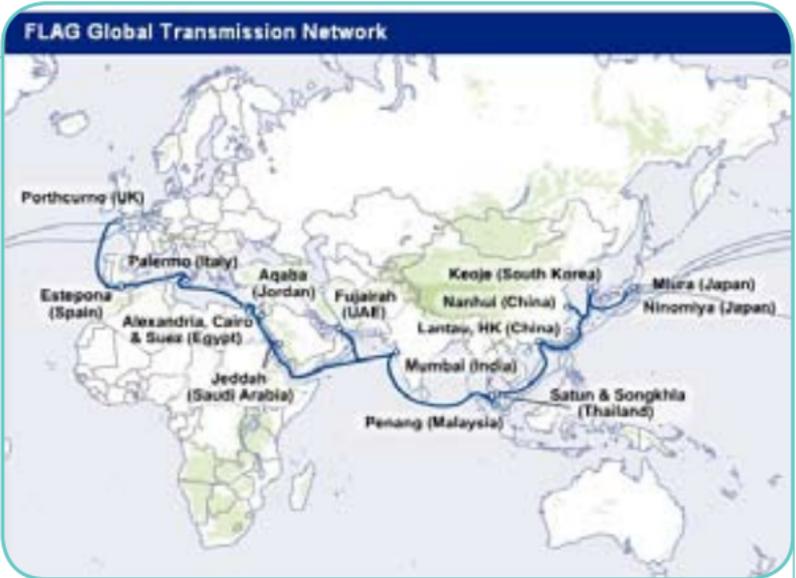
It’s important to note that system disruptions don’t require intentional military operations to have a profound effect. Because of dense infrastructure connections and vulnerabilities, the effects of natural disasters (such as Hurricane Katrina) and accidents (as with the East Coast power outage of 2002) can be multiplied by the cascading collapse of infrastructure and networks.

## FORECASTS:

- System disruption will become the strategy of choice for insurgent movements worldwide—relying on lessons learned from the successes of other movements.
- Political legitimacy, in general, is likely to be undermined by ongoing system failures, making policies that call for sacrifices by the citizenry more difficult to enact.
- The success of system disruption tactics will trigger increased research and development of more resilient systems, ultimately undermining the value of the system disruption approach.

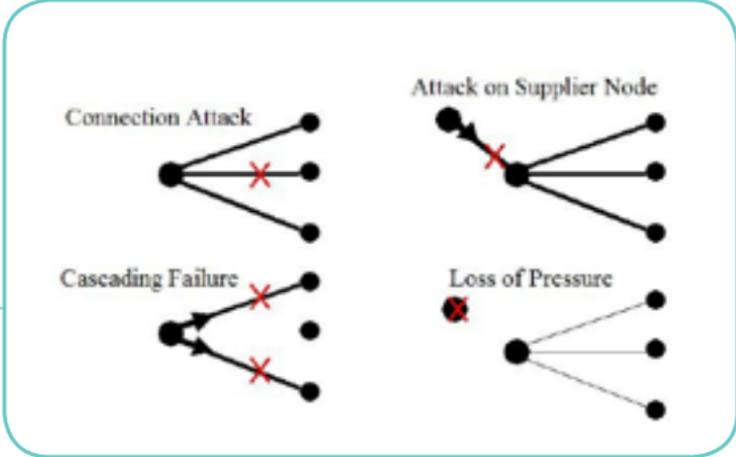
# SYSTEM DISRUPTION

<http://blog.wired.com/27bstroke6/2008/01/fiber-optic-cab.html>



Multiple cable cuts to the undersea telecommunication cables that support South Asia led to service disruption for millions of Internet users in early 2008.

In dynamic infrastructure networks, cascading system failures can be triggered by identifying and disabling highly connected nodes; by attacking a few connections to highly connected nodes, overwhelming other connections; and by disrupting the supply facilities.



[http://globalguerrillas.typepad.com/globalguerrillas/2004/05/cascading\\_system.html](http://globalguerrillas.typepad.com/globalguerrillas/2004/05/cascading_system.html)

**John Robb** "In Iraq, systems disruption is the 'secret sauce' of the insurgency. A series of relatively infrequent and small attacks have held the Iraqi electricity, oil, and water systems at nearly pre-war levels despite a massive reconstruction campaign. This success has fueled the insurgency by creating economic chaos and radically decreasing the legitimacy of both the US occupation and the new Iraqi government."

# AUTOIMMUNE SOCIETY



In biology, autoimmune disorders occur when a body's own immune system, perhaps triggered by a minor insult, attacks the body, leaving it damaged and weakened. This disorder has a political analogy: actions taken to fight a threat can sometimes cause far greater harm than the threat itself. Long term, such autoimmune reactions can cause significant, long-lasting injury to the overall body politic.

## WHAT TO WATCH

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- Feral cities
- Hollow communities
- Collapse of freedoms
- Environmental collapse
- Genocide

Ongoing system disruption is a core strategy of open-source warfare. Normally, we think of such damage coming from the direct action of attackers: blowing up power plants, attacking food shipments, disrupting transportation systems. But a potentially more effective form of system disruption happens as the result of actions taken by the state itself in response to a threat (or perceived threat) from insurgents—as a result of defensive measures taken to head off an attack.

The reaction to “chlorine bombs” in Iraq is a case in point. Following unsuccessful “chlorine bomb” attacks in mid-2007, chlorine was tightly restricted. The intention was to make it harder for insurgents to use chlorine to create improvised chemical weapons. The actual result was to disrupt the water infrastructure by putting a stranglehold on the ability to purify water, in turn leading to cholera outbreaks.

Research suggests that low-level autoimmune reactions benefit body by training the immune system. The critical problem is recognizing unhealthy auto-immune responses—both in the human body and in the body politic.

## FORECASTS:

- Networked-based opponents of hierarchies will learn how to reliably trigger autoimmune responses in order to undermine the legitimacy of those hierarchies—a strategy that will not be limited to military conflicts.
- In the throes of autoimmune responses, there will be ongoing debates over the need to end operations—framed in terms of “giving up” vs. “stop making things worse.”
- Networked-based tools, from bottom-up monitoring to models based on sensor network data, will be developed to identify autoimmune responses early on.

# AUTOIMMUNE SOCIETY

Source: [www.TSA.gov/311](http://www.TSA.gov/311)  
<http://jetlagged.blogs.nytimes.com/2007/12/28/the-airport-security-follies/>



Air travel conditions have been continuously degraded by security restrictions that have little actual benefit—for example, scientists argue that it would be nearly impossible to construct an on-plane bomb from the kinds of liquids the 3-1-1 policy restricts.

Chlorine bombs in Iraq in 2007 led to tight restrictions on chlorine—which in turn led to a cholera outbreak due to unsafe drinking water.



<http://www.nytimes.com/2007/02/22/world/middleeast/22iraq.html>

**Eric Urmansky** “[T]he biggest damage from chlorine bombs—as with so many terrorist attacks—has come from overreaction to it. Fear operates as a ‘force multiplier’ for terrorists, and in this case has helped them cut off Iraq’s clean water. Pretty impressive feat for some bombs that turned out to be close to duds.”

# PLATFORMS FOR RESILIENCE



In the new landscape of open-source warfare, designing and managing structures for economic, political, and social resilience will be a critical strategic capacity of organizations and communities. As nation states struggle to cope with the disruptions and shocks of an inherently unpredictable global society, innovations will emerge at the regional level, increasing the legitimacy of local communities in the global political sphere.

## WHAT TO WATCH

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- Open-source intelligence
- Open-source civil planning
- Open-source simulations and models
- Resilience-based insurance
- Social cities

In a world of rapid and unforeseeable change, society will need to choose resilience over stability. The goal of resilience is to minimize the impacts of threats rather than the number of threats. It's not a pre-emptive strategy but a strategically responsive capacity for absorbing and localizing damage. Resilience focuses on rapid identification of threats, mitigation of their damage, and learning to innovate new responses and techniques for mitigation. Resilient systems and infrastructures need to be open, flexible, and transparent.

Much of the innovation will be local. New York City is sponsoring a design competition to enhance the city's ability to provide provisional housing for after a major coastal storm. The Transition Towns Wiki is an initiative in England for use by all the communities that have adopted the Transition Model for responding to the twin challenges of peak oil and climate change. The wiki is a catalyst for collecting bottom-up knowledge and insight about ways to implement community programs necessary to survive and thrive in the context of peak oil and climate change.

## FORECASTS:

- Regions and communities that develop resilience will gain investment, earn higher real estate value, and attract creative class cohorts.
- Nation-states will lose power as regions and local governments or organizations adopt platform-based resilience models based on openness and networks.
- Local cities and regions will split between feral and social communities, creating a new divide between those connected into the resilience platforms and those left with rigid infrastructures.
- New insurance and risk strategies will emerge that are based on resilience capacity rather than problem solving and stability.

# PLATFORMS FOR RESILIENCE

## Transition Towns WIKI

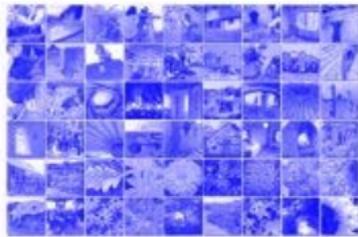
TransitionNetwork / TransitionTraining

<http://www.transitiontowns.org/>

The Transition Towns Wiki is a catalyst for collecting bottom-up knowledge and insight about ways to implement community programs necessary to survive and thrive in a world of peak oil and climate change.

### Kinsale 2021

An Energy Descent  
Action Plan – Version.1. 2005



By Students of  
Kinsale Further Education College

Edited by Rob Hopkins



## InSTEDD

Innovative Support To Emergencies  
Diseases and Disasters

Google has created InSTEDD as an innovation lab for developing tools for better early disease detection and rapid disaster response. Their goal is to improve global resilience by developing a better global immune system – a toolset and capacity for rapid prototyping and dissemination of tools and applications that work at the field level.

<http://instedd.org/>



## OTHER RESOURCES:

### Open-Source Intelligence:

<http://www.appliedautonomy.com/terminalair/index.html>

<http://www.guardian.co.uk/uk/2005/dec/10/usa.terrorism1>

<http://www.radioopensource.org/google-earthing-the-north-korean-military/>

[http://www.ogleearth.com/2006/02/chinas\\_secret\\_n.html](http://www.ogleearth.com/2006/02/chinas_secret_n.html)

### Social Cities:

[http://blogger.iftf.org/tyf/docs/Perspectives06/TYF\\_06%20urb%20soc%20cities.pdf](http://blogger.iftf.org/tyf/docs/Perspectives06/TYF_06%20urb%20soc%20cities.pdf)

**InSTEDD Mission Statement** “Our ultimate goal is a better global immune system. We know we alone can’t truly stop diseases, war, poverty, or climate change, but we think we can help humanity to learn about threats faster, and so respond quicker, and so soften the impact.”

# END OF FISHING



Climate change and over-fishing have combined to threaten the viability of global fisheries, raising the very real possibility of mass extinctions of a variety of fish species. Already, numerous local fisheries around the world have collapsed, and the rush to meet a growing demand for fish has had unexpected consequences for ocean ecosystems. Key issues include the mechanisms of fish “production,” ecosystem disruption, and the impact of global warming.

## WHAT TO WATCH

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- Near-collapse of bluefin tuna, swordfish, and salmon
- “Fishprint” impact model
- Exploding demand for “Seafood Watch” information cards
- Genetic identification as a tool for monitoring fish stocks
- Re-emergence of “retro” fishing methods for more selective catch
- Biological tailoring of local policies
- NGO certification of sustainable fisheries and practices

Although fishing has been a part of global civilization for millennia, our technology-enhanced capacity to harvest fish has had a profound and unanticipated result: the collapse and near-collapse of many of the key fish species. Moreover, the changes to the global environment caused by global warming, ocean pollution, and other human impacts have further exacerbated the threat to fish species. Disease, acidification, and chemical changes to the oceans have further accelerated the pace at which fish species die-off.

The rapid and dramatic alteration of the balance of species has also had a startling impact on ecosystems. Many of the most sought-after food stock fish are top predators (akin to lions or bears). Their elimination has allowed competing and preyed species, many of which have no commercial or food value, to proliferate. According to one study, the devastation of tuna has triggered an explosion of cephalopods. Another study suggests that the practice of regulating the size of fish that can be caught has become a form of artificial selection, reducing the overall size of regulated fish species.

## FORECASTS:

- Major global fish species—key sources of food—will become extinct.
- Non-food species, competing with collapsed species, will grow rapidly.
- Internet-based markets for certified fish and those with genetic IDs will grow.
- Unmanned underwater vehicles that monitor fishing practices and fishery health from inside the ecosystem will become “robotic shepherds” for endangered species.

# END OF FISHING

Source: <http://www.mbayaq.org/cr/seafoodwatch.asp>



The Monterey Bay Aquarium has developed a series of regional Seafood Watch guides, designed “to raise consumer awareness about the importance of buying seafood from sustainable sources.” The guides can be downloaded from the Internet or reviewed on mobile devices. The Seafood Watch program, which partners with the Seafood Choices Alliance, sees itself as helping consumers to become advocates for environmentally friendly seafood.

Last year, Project CROOS at Oregon State University completed an initial test of genetic stock identification (GSI) and geographic information systems (GIS) to manage fishing stocks in real time. Participating fisherman tagged the fish they caught with barcode tags and clipped a fin tip of each fish for overnight genetic testing. The combination of the genetic and location data allowed the project to link the fishing areas to sources, for near real-time management of fishing. The barcode tags could eventually follow the fish to market, assuring consumers of sustainably harvested purchases.



Source: <http://projectcroos.com>

## OTHER RESOURCES:

### Retro fishing:

<http://www.ccchfa.org/index.php>  
<http://www.hudsonfish.com/links.html>

### “Fishprint” analyses:

<http://www.searoundus.org/trophiclevel/footprintmain.aspx>

### Extinction of bluefin tuna:

<http://ngm.nationalgeographic.com/ngm/0704/feature1/index.html>

**Kate Wing** “While consumer awareness cards are all the rage, the fact remains that American consumers still can’t be sure they’re getting the fish they order. From Consumer Reports to local newspapers, anyone who tests for fish species finds that lots of fish called red snapper aren’t anything close. The FDA is charged not only with testing for contaminants but also for insuring truth in labeling, and they are far too underfunded and understaffed to be able to track all the fish sold in the United States. New requirements, like Country of Origin Labeling (a.k.a the COOL provisions of the farm bill) should help increase transparency for consumers, but it’s still much too easy to pass off a white fillet of cheap unknown fish X as high-end fish Y. You can get more info on a box of crackers than you can on a piece of fish. The solution? Get genetic.”

# THE LITTORAL CONVERGENCE



The littoral zone—the tidal area where the ocean meets the land—is emerging as a critical arena where the impacts of global climate change, urbanization, and industrialization will converge. It's the area where most people live and cities are growing fastest. But it's also the area where impacts will be most acutely felt, from pollution to displacement to climate instability to the need to develop alternate sources of food and bioindustry feedstock. Quite literally, we'll see the emergence of new "wetlands," but they'll look more like Venice or Dhaka than the Meadowlands.

## WHAT TO WATCH

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- Coastal ecosystem services analyses
- Role of coastal vegetation in coastal storm defense
- Littoral development: 66% of human population lives within 40 miles of the ocean
- New kinds of weather-resistant materials—both from and for littoral zones
- SMS disaster preparedness systems

As rising sea levels threaten coastal areas, residents of these regions have four main strategies for coping: relocate, build sea walls, use natural wetlands as protection, and "homestead" the sea. Many communities are beginning to realize that natural wetlands are the most effective and cost-efficient way to secure their real estate—for example, the role that the mangrove forests played in protecting some coastal areas from the 2004 tsunami in Southeast Asia. Sea walls and barriers are likely to be prohibitively expensive and will only buy time for people to relocate—which will also take time and money and disrupt local and global economies alike.

"Homesteading" the seas will emerge as a new meme: new and old materials, from carbon fiber to bamboo, will make living in these estuary-like environments feasible in both rich and poor countries. The increased demand for protein will support a strong aquaculture economy in these areas. The question is what impact these homesteads will have on the crucial littoral zone of the planet's ecology.

## FORECASTS:

- Research into the natural materials of littoral zones will help foster new materials development.
- Investment in coastal protection will slowly shift from engineered structures to natural landscape development.
- Ecosystem services will provide a framework for a new ecosystem approach
- to managing large and local coastal areas.
- Increased cooperation between insurance companies and governmental zoning bodies will help to prevent over-coverage, encouraging unsafe development and under-coverage, leading to loose zoning.

# THE LITTORAL CONVERGENCE

The Center for Remote Sensing of Ice Sheets (CReSIS) at University of Kansas is using sensors and unpiloted airborne vehicles (UAVs) to track the melting of the ice sheets in Greenland and the Antarctica to better predict sea level rise. They have also modeled the impacts of sea level rise on several key coastal areas worldwide. These images show, first, the population distribution along the southeast coast of the United States and, second, the projected areas of inundation, given a 6 meter rise in sea level.

Source: [https://www.cresis.ku.edu/research/data/sea\\_level\\_rise/](https://www.cresis.ku.edu/research/data/sea_level_rise/)



## Evolution of a Marsh as Sea Level Rises

**6,000 Years Ago**



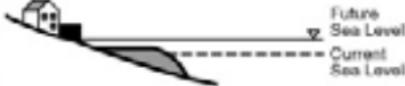
**Today**



**Future**

Substantial Wetland Loss Where House is Moved or Upland is Vacant

Complete Wetland Loss Where House is Protected with Bulkhead in Response to Rise in Sea Level



**LEGEND**

Sedimentation and Peat Formation Marsh

Coastal marshes have kept pace with the slow rate of sea level rise that has characterized the last several thousand years. Thus, the area of marsh has expanded over time as new lands have been inundated. If in the future, sea level rises faster than the ability of the marsh to keep pace, the marsh area will contract. Construction of bulkheads to protect economic development may prevent new marsh from forming and result in a total loss of marsh in some areas.

Source: Titus, J.G. 1991. Greenhouse Effect and Coastal Wetland Policy. *Environmental Management* 15(1): 39-58.

Source: <http://www.epa.gov/climatechange/effects/coastal/index.html#loss>

**Adam Gruen** "Very wealthy nations/interests won't care because they can rebuild or relocate; very poor nations and peoples won't be able to do much except fight, curse, flee, or die. But the "middle class" of the world may have the highest incentive and yet be able to afford to do something about it."

# THE BLUE COMMONS



For centuries, nations have struggled politically and militarily over the wealth of the seas, competing for trading routes, food, and defense against invasion. Today, we see new geopolitical conflicts emerging over the collapse of fisheries, whaling practices, pollution, and the energy resources of the deep sea floor. These conflicts are playing out along predictable lines; they are essentially over natural resources. However, as we move forward, the way nations struggle over the oceans will begin to resemble the way we are now dealing with the atmosphere—as a global ecosystem service.

## WHAT TO WATCH

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- Ocean science information commons
- Extension of national waters beyond the current 300-mile limits
- Conflicts over privatization vs. ecosystem management solutions
- Growth of integrated coastal zone management (ICZM)

Over the past 50 years, there has been a growing move to “enclose” parts of the ocean, from establishing ever-wider national territorial waters to providing exclusive fishing or mining rights in certain areas. Proponents of this so-called “privatization” of the ocean have argued that it avoids the tragedy of the commons. At the same time, the jurisdictions of various agencies assigned to oversee the oceans do not correspond at all to biological boundaries that might best be managed as a complete ecology.

Over the next decade, however, new information-based commons, together with the new science of ocean ecologies, could suggest possible new models for managing a global commons from an ecological perspective. The ability to create complex models that link multiple features of an ocean ecology to human impacts—often in near real time—could combine with bottom-up systems for mutual monitoring and self-regulation. And both of these may well be guided by the emerging principles of ecosystem-based management and so-called integrated coastal zone management (ICZM).

## FORECASTS:

- Conflicts between privatization strategies and new forms of ecoscience-driven commons will escalate over the next decade as the world scrambles to respond to the problems facing the oceans
- Comprehensive ocean zoning will refocus ocean management on biological boundaries that treat an entire ecosystem (including fishing, mining, energy, and development impacts) rather than addressing these various functions independently.
- Ecosystem-based management will gradually provide a framework for managing competing interests in the ocean commons.

# THE BLUE COMMONS



The Communication Partnership for Science and the Sea (COMPASS) is a collaborative effort of scientists to bridge the fields of marine conservation science, public interest, and marine policy. With a specific emphasis on marine ecosystem services and ecosystem-based management, their mission is to accelerate the pace of solving the problems that face today's oceans.

Source: [http://www.compassonline.org/marinescience/solutions\\_ecosystem.asp](http://www.compassonline.org/marinescience/solutions_ecosystem.asp)

## WHAT IS ECOSYSTEM-BASED MANAGEMENT FOR THE OCEANS?

Ecosystem-based management is an integrated approach to management that considers the entire ecosystem, including humans. The goal of ecosystem-based management is to maintain an ecosystem in a healthy, productive, and resilient condition so that it can provide the services humans want and need. Ecosystem-based management differs from current approaches that usually focus on a single species, sector, activity or concern; it considers the cumulative impacts of different sectors.

Specifically, ecosystem-based management:

- emphasizes the protection of ecosystem structure, functioning, and key processes;
- is place-based in focusing on a specific ecosystem and the range of activities affecting it;
- explicitly accounts for the interconnectedness within systems, recognizing the importance of interactions between many target species or key services and other non-target species;
- acknowledges interconnectedness among systems, such as between air, land and sea; and
- integrates ecological, social, economic, and institutional perspectives, recognizing their strong interdependences.

Ecosystem-based management is emerging as a strong framework for rethinking policy and management in a variety of environments and industrial sectors that are facing growing ecological threats. The Pew Oceans Commission and the U.S. Commission on Ocean Policy recently developed the above consensus statement, "calling for a more comprehensive, integrated, ecosystem-based approach to address the current and future management challenges of our oceans."

## OTHER RESOURCES:

### Lead efforts in integrated coastal zone management in New Zealand and Indonesia

<http://www.fish.govt.nz/en-nz/default.htm>  
<http://www.nibr.no/content/view/full/669>

### U.S. West Coast Governor's Agreement on Ocean Health:

[http://www.usc.edu/org/seagrant/WC\\_Ocean\\_Agreement.pdf](http://www.usc.edu/org/seagrant/WC_Ocean_Agreement.pdf)

**Kate Wing** "Countries like the United States and the United Kingdom, which have kept their extractive agencies separate from their environmental conservation agencies, are being forced to bring those two sides together to look at marine ecosystems. This is an issue not only for sustainability, but also for creating workable regulatory processes for new ocean uses, like offshore aquaculture and wave energy."

# THE GOLDEN AGE OF OCEANOGRAPHY



Vast swathes of high-resolution data for a host of ocean properties will feed and iteratively improve scientists' models and simulations of the ocean as an ecosystem. Models will be three-dimensional rather than two- or one-dimensional. Measurements will be continual rather than sporadic. And wide-scale sampling of the genetic diversity in marine microbes will lead to a much more sophisticated—and perhaps actionable—view of marine ecologies.

## WHAT TO WATCH

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- Earth observing satellite (EOS) systems for ocean data
- Low-cost underwater sensor networks
- 3-D models of ocean processes
- Improved global meteorological and atmospheric models
- Mapping of new ocean species
- Growth of amateur and NGO ocean science

New data on the ocean is pouring in from diverse fields, providing a new view of an ecosystem that has been relatively hidden. As costs of ocean observation drop with new sensor technology, continuous monitoring tasks will become practical. In contrast to sporadic measurements taken from boats, this ongoing data stream will enable detailed modeling with iterative feedback—including modeling of human impacts on the ocean.

For the first time, measurements of horizontal variability can routinely be made at high-spatial resolution (in hundreds of meters versus the 10 or more kilometers in typical operational scenarios). Fleets of robots will provide three-dimensional images of water flow and other ocean processes. Several recent large-scale projects have focused on uncovering the ocean's store of genetic diversity and continual discoveries of new marine species. Findings range from the 20 new species of sharks in the waters around Indonesia to the 6 million new genes discovered by Craig Venter's massive genomic survey of oceanic microbial life.

## FORECASTS:

- Multiple, linked ocean-modeling systems will enable real-time predictions of ocean conditions—impacting fishing, shipping, and mining, as well as improving predictive capabilities of atmospheric and meteorological modeling.
- It is entirely possible that nations will scale back data-collection operations as they turn up evidence of damage to ecosystems—catalyzing a surge of amateur scientists and NGO analysts to fill the gap in scientific data.
- Information from the genomic sampling projects will have useful spillover into numerous areas of science, including protein family evolution, biological energy production, bioremediation, and, potentially, disease identification and prevention.

# THE GOLDEN AGE OF OCEANOGRAPHY

Source: [http://www.aquanet.com/images/stories/news2/who\\_i\\_rov3.jpg](http://www.aquanet.com/images/stories/news2/who_i_rov3.jpg)



Autonomous underwater vehicles (AUVs) are increasingly being developed and tested as tools for exploring the sea floor and mapping areas that were previously inaccessible for study. This is an illustration of AUVs from a project at the Woods Hole Oceanographic Institution (WHOI) to use the robotic vehicles beneath the

ice of the Arctic Ocean to locate hydrothermal vent sites on the seafloor of the Arctic Ocean. (Illustration by E. Paul Oberlander, Woods Hole Oceanographic Institution.)

CAMERA is the Community Cyberinfrastructure for Advanced Marine Microbial Ecology Research and Analysis database managed by CallT2 at the University of San Diego. It is “a continually evolving tool where anyone can access raw environmental sequence data, associated metadata, pre-computed search results, and high-performance computational resources.” It was developed, in part, to support the efforts of the J. Craig Ventner Institute to map the genetic diversity of microbial life in the ocean.



Sources: <http://www.jcvi.org/cms/research/projects/camera/overview/>  
<http://www.jcvi.org/cms/research/projects/gos/overview/>

## OTHER RESOURCES:

### Genetic mapping of new shark species:

[http://www.breitbart.com/article.php?id=D8NIP13Oo&show\\_article=1](http://www.breitbart.com/article.php?id=D8NIP13Oo&show_article=1)

### New tagging technologies for underwater data capture:

[http://www.livescience.com/animals/070312\\_squid\\_whales.html](http://www.livescience.com/animals/070312_squid_whales.html)

[http://www.underwatertimes.com/news.php?article\\_id=72160384951](http://www.underwatertimes.com/news.php?article_id=72160384951)

<http://www.technologyreview.com/Infotech/19155/?a=f>

**Jim Bellingham** “With new genomic technology, it is now possible to process ocean water and reconstruct the genomes of the organisms contained in that water sample. This is leading to the identification of new organisms and revolutions in understanding of what role organisms might play in the ecosystem.”

# BATTLE AGAINST GLOBAL WARMING



Oceans play a key role in regulating the global climate, but they are also hosts to some of the most devastating impacts of climate change. Over the next decade, as the risks to the ocean become more apparent, some policymakers will advocate significant, and even drastic, ocean engineering projects to fight the larger battle against global warming. As states struggle to agree on interventions and understand their political consequences, rogue non-state actors may take things into their own hands.

## WHAT TO WATCH

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- Ocean fertilization
- Thermal pumps
- Seawater pumps
- Acidification and disappearance of coral reefs
- Reduction of oceans' capacity to absorb CO<sub>2</sub>
- Methane clathrate melts (frozen methane in the permafrost)

CO<sub>2</sub> emissions have begun to upset the oceans' ability to regulate the climate by raising the oceans' temperatures and acidity. The long-term impacts remain uncertain. Warming oceans may increase hurricane intensity. Ocean acidification could destroy coral reefs and kill marine larvae, devastating the overall ocean food chain and reducing—perhaps severely—a key source of global oxygen. If the ocean's capacity to absorb CO<sub>2</sub> declines, atmospheric CO<sub>2</sub> levels will rise, accelerating global warming. Finally, rising temperatures might help release methane, a far more destructive greenhouse gas than CO<sub>2</sub>, trapped in the deep ocean floor.

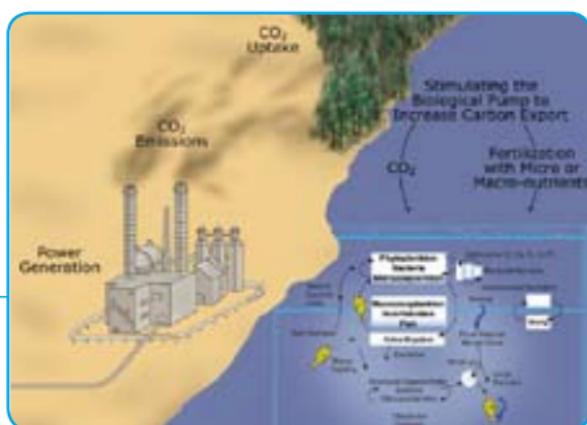
As the ocean moves to the center of the climate change debate, expect increasing exploration into methods of large-scale geo-engineering intervention. These include fertilization of the oceans to increase algae and plankton absorption of CO<sub>2</sub>; systems to pump aerosolized seawater into the upper atmosphere to block a fraction of incoming sunlight; and thermal pumps to bring cooler water to the surface to reduce storm intensity. The full consequences of these strategies are largely unknown, making their implementation all the more controversial, but if conditions worsen, these projects will receive greater attention.

## FORECASTS:

- The combination of acidification and methane clathrates could set up strong positive feedback effects of warming in the oceans, threatening both ocean and surface life.
- As the immense secondary and tertiary effects of ocean disruption are realized, political debates regarding responsibility and jurisdiction around the ocean will intensify.
- Political conflicts over geoengineering may take a higher profile over the next decade, with vigorous debates about liability, funding, and unanticipated consequences.
- A “black swan” event may be a large-scale ocean geoengineering project beyond the reach of any nation-state or international agency—perhaps initiated out of desperation.

# BATTLE AGAINST GLOBAL WARMING

Source: <http://www.esd.lbl.gov/CLIMATE/OCEAN/fertilization.html>



One strategy for battling

global climate change is to use fertilizers to stimulate the ocean's "biological pump"—photosynthetic carbon uptake by phytoplankton and the transport of carbon into the deep sea through sinking organic matter. However, not all regions of the ocean could support the increased biomass that would result and such fertilization methods can increase ocean acidification.



The company Planktos proposed to dump iron, a plankton nutrient, into certain areas of the ocean, stimulating plankton growth to soak up atmospheric carbon. Planktos planned to sell carbon offset credits for the fertilization. They recently indefinitely postponed the project, citing "a highly effective disinformation campaign." Expect more such initiatives to emerge as carbon credit markets grow.

Source: <http://www.nytimes.com/2007/05/01/business/01plankton.html>

## OTHER RESOURCES:

### **Ocean acidification and impacts on coral reefs:**

<http://www.usgs.gov/newsroom/article.asp?ID=1847>

### **Reduction of oceans' capacity to absorb CO<sub>2</sub>:**

[http://www.sciencemag.org/cgi/content/abstract/316/5832/1735?max\\_toshow=&HITS=10&hits=10&RESULTFORMAT=&fulltext=ocean+CO<sub>2</sub>+absorbtion&searchid=1&FIRSTINDEX=0&resourcetype=HWCIT](http://www.sciencemag.org/cgi/content/abstract/316/5832/1735?max_toshow=&HITS=10&hits=10&RESULTFORMAT=&fulltext=ocean+CO2+absorbtion&searchid=1&FIRSTINDEX=0&resourcetype=HWCIT)

### **Atmospheric methane and the melting of the Siberian permafrost:**

<http://www.iab.uaf.edu/news/news.php?newsrel=37>

### **Ocean acidification projects:**

<http://www.planktos.com/>

<http://www.climos.com/index.html>

**Adam Gruen** "A panglossian interpretation to be sure: Climate change and rising sea level will be a nasty experience in this Holocene boundary of species extinction rivaling the K-T layer wipeout. Humanity may not survive. But some species will thrive and prosper....A recent study indicates that detritus from melting icebergs and glaciers might actually have a beneficial effect on the food chain, creating oases of life and improving carbon sequestration....If the carbon sequestration angle holds true, then glaciers calving and melting faster might actually be the kind of negative feedback loop that Earth uses every now and then to regulate atmospheric temperature. Unclear what is going to sequester methane, but one problem at a time."

# THE NEW SEA POWER



Over the next decade, as reliance on fossil fuels declines, the oceans' role as a source of energy will grow, with the deployment of new renewable energy technologies such as ocean thermal energy conversion and hydrokinetic generation. These offer abundant electric power, with fewer of the drawbacks currently associated with renewable generation. Key issues include costs of development, power transmission, and the potential for unanticipated consequences.

## WHAT TO WATCH

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- The wave hub
- The Manchester bobber
- Pelamis wave energy converter
- Shihwa Lake tidal power plant
- Gorlov helical turbine

Although undersea oil production continues to be a key source of fossil fuels, the easier-to-reach reservoirs near the coasts have largely been depleted. And while traditional energy companies seek out deeper and more difficult sources of petroleum and gas, a variety of new energy technologies are taking advantage of ocean physics to offer renewable power.

For example, ocean thermal energy conversion (OTEC) exploits the difference in temperature between the sea surface and the depths, essentially creating a heat pump that extracts solar energy absorbed by the sea surface, converting it to electricity.

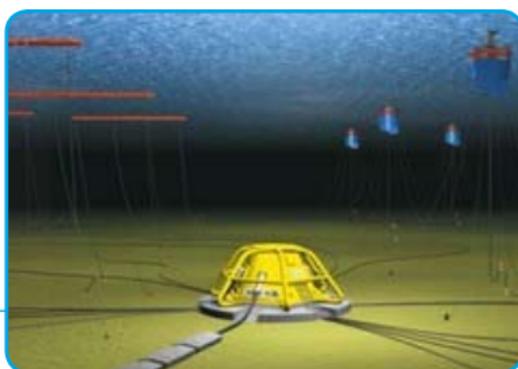
Hydrokinetic energy relies on the motion of waves, tides, and current to generate electricity. According to the Electric Power Research Institute, the total wave energy potential for the United States is over 2,300 terawatt-hours annually, nearly ten times the current annual consumption. Ocean power would suffer fewer "intermittency" problems than solar and wind power, and would be less likely to trigger fights over land use or coastal aesthetics. However, the technology is less mature and the potential for unexpected results from real-world deployment remains a concern.

## FORECASTS:

- Investments in hydrokinetic and ocean thermal power systems will likely follow the path of other renewable technologies like wind and solar.
- Activists fighting the deployment of offshore wind farms for aesthetic reasons will begin to push wave farms as an alternative, despite questions of maturity and cost.
- Hawaii could aggressively deploy wave energy systems to replace oil-based power plants.
- Deployments of ocean power could put the United Kingdom on a path to generate more than 5% of its electricity via hydrokinetic systems by 2020.

# THE NEW SEA POWER

Source: Industrial Art Studio Ltd, St Ives, Cornwall.  
[www.ind-art.co.uk](http://www.ind-art.co.uk)



The world's first large-scale wave farm is being built off the coast of Cornwall in South West England. The project hopes to demonstrate the effectiveness of using networked arrays of wave energy devices. For more information, visit <http://www.wavehub.co.uk/>.

The Gorlov helical turbine is a small-scale energy technology that can be used to generate power from both river and ocean currents. It is being positioned as a lightweight infrastructure technology that can bring energy to remote areas and provide grid-independence in more populated coastal areas in poorer economies.



Source: <http://www.gcktechnology.com/GCK/pg2.html>

## OTHER RESOURCES:

### **Manchester Bobber wave energy device**

<http://www.manchesterbobber.com/>

### **Pelamis wave energy converter**

<http://www.pelamiswave.com/gallerydiagram.php>

### **Shihwa Lake Tidal Power Plant**

<http://www.worldchanging.com/archives/001586.html>

**Jim Bellingham** "The oil and gas industry is drilling oil wells in progressively deeper portions of the ocean. At one time, drilling offshore meant drilling in a few tens of meters of water. Now, oil is being produced from wells in over 2000m water depths, requiring a wide range of new technologies, and extremely sophisticated and costly infrastructure. Even as the price of oil rises, exploration will be forced to move to deeper and deeper water."

# DESIGNS FOR FOOD SUSTAINABILITY



In response to the problems of industrial agriculture, agroecologists are advocating a host of new farming practices that might prove more sustainable—environmentally, societally, and economically—as the world population grows. These practices target innovations for global development as well as urban solutions, and incorporate new marketplace standards and tools for encouraging sustainable food practices.

## WHAT TO WATCH

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- Re-wilding movement
- Native farming
- Buffalo Commons
- Food footprinting
- Green retail
- LEED standards
- International and domestic fair trade

Alternatives to industrial agriculture—from traditional farming systems to strategies that link cultivation to restoration of wildlands—are providing new templates for sustainable cultivation. For example, over the past 25 years, agroecologists have identified traditional farming systems that yield high productivity on marginal lands by incorporating biodiverse intercropping, efficient local cycling of resource inputs, water and pest management, and cultural knowledge systems that support nuanced relationships between management practices and the local (and sometimes global) environment. Examples range from Mexican chiampas farmers who cultivate floating mats of mud in a centuries-old hydroponic practice to the Ifugao of the Philippines, who cultivate rice in terraces that integrate 261 species.

Meanwhile, sustainable agriculture meets wildlands restoration in movements that seek to restore large predators as a way to stabilize the food chain; that offer designs for mixing farmland and wilderness areas; and that seek to restore native species of both plants and animals (such as buffalo). All these efforts find support from the growth of green retail and its accompanying certification programs—such as LEED certification and international and domestic fair trade programs.

## FORECASTS:

- Like urban centers of innovation, regional centers of new sustainable agricultural practices will emerge, with a focus on reintegrating wilderness and agriculture.
- A renaissance of native farming practices, will be supported by new kinds of green certification standards.
- Fair trade standards will be applied increasingly to domestic as well as international food production.
- Food labeling will begin to include sustainability indicators such as the carbon footprint—including carbon credits for sustainable cultivation

# DESIGNS FOR FOOD SUSTAINABILITY



Source: <http://www.wildfarmalliance.org/>

The Wild Farm Alliance (WFA) promotes agriculture that helps to protect and restore wild Nature, envisioning “a world in which community-based, ecologically managed farms and ranches seamlessly integrate into landscapes that accommodate the full range of native species and ecological processes.”

The Ifugao have been cultivating rice terraces in the mountains of the Philippines for several thousand years, in a carefully maintained landscape ecology that protects biodiverse forested headwaters containing as many as 261 species: 171 for fuel wood, 11 for construction and woodcarving, 70 as food sources, 10 species of rattan used for food, basketry, and tying, and 45 species used for herbal medicine.



Source: [http://upload.wikimedia.org/wikipedia/commons/thumb/1/17/Rice\\_Terraces\\_Banaue.jpg/400px-Rice\\_Terraces\\_Banaue.jpg](http://upload.wikimedia.org/wikipedia/commons/thumb/1/17/Rice_Terraces_Banaue.jpg/400px-Rice_Terraces_Banaue.jpg)

## OTHER RESOURCES:

### Native Farming Practices:

<http://www.agroeco.org/doc/NRMfinal.pdf>

<http://geography.berkeley.edu/programcourses/coursepagesfa2004/geog148/Term%20Papers/Sanaz%20Memarsadeghi/whatis.htm>

### Food footprinting and carbon labeling:

<http://news.bbc.co.uk/2/hi/business/6276351.stm>

<http://www.worldchanging.com/archives/005403.html>

[http://www.agrifoodstandards.net/en/news/global/fresh\\_standards\\_leading\\_food\\_companies\\_test\\_carbon\\_footprint\\_methodology.html](http://www.agrifoodstandards.net/en/news/global/fresh_standards_leading_food_companies_test_carbon_footprint_methodology.html)

**Leslie Zucker** “The public may long to know a remote and biodiverse wilderness exists, but it’s an open question whether attitudes will shift to see the value of cougars and wolves living again in our midst. It’s been a while since humans were not the sole predator at the top of the food chain....A true shift toward recognizing the value of healthy food webs to human life, even as we become potential prey, will be necessary.”

# COOPERATIVE INNOVATION



Bottom-up cooperative strategies are innovating food production and distribution—both to support a more resilient food web and to meet specific food needs. A do-it-yourself ethic combines with cooperative and collaborative technologies to support new food value chains that provide an alternative model to traditional food supply chains.

## WHAT TO WATCH

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- Food production and distribution cooperatives
- Networked “victory” gardens
- Food value chains
- Artisan food movement

Consumers are getting directly involved in food production and distribution in efforts that range from new networks of backyard gardens to consumer food collectives. In the United States, for example, San Francisco is experimenting with a subsidized home gardening program for individuals and neighborhoods. The nonprofit Roots of Change is building an alliance of diverse stakeholders to create a new sustainable food system for California.

In Japan, over 800 organizations, aligned by region and prefecture, serve about 20% of Japanese households. One of the largest and most successful co-ops is the Seikatsu Club—a food collective that holds human and environmental health and a critique of consumerist lifestyles as its central tenets. In China, the Guoren food co-op in a northern suburb Beijing focuses on safe food, building its own fair-trade certification as an alternative brand to national organic certifications, which have low credibility.

Ultimately, these experiments are driving a new vision of the food system—not so much as a supply chain, but as a value chain that strives to value all aspects of food: taste, health, local commerce, ethics, and biodiversity, among others.

## FORECASTS:

- Health and safety, more than lower prices, will be key drivers in the growth of food cooperatives worldwide—with sophisticated innovations in certification that distinguish them for international grocery chains.
- Grassroots food experiments will increasingly link together, possibly forming local P2P micro-food economies.
- Next-generation community-supported agriculture will blend with the emerging artisan food movement.

# COOPERATIVE INNOVATION

Source: <http://www.rocfund.org/>

## Roots of Change



Roots of Change is a collaborative of diverse leaders and institutions unified in common pursuit of achieving a sustainable food system in California by 2030.

VG2007+ is a two-year pilot project to turn yards, window boxes, rooftops, and unused urban plots into a citywide network of urban farmers.



Source: <http://www.futurefarmers.com/victorygardens/>

## OTHER RESOURCES:

### Food cooperatives worldwide:

<http://www.seikatsuclub.coop/english/>

<http://www.iisd.org/50comm/commdb/desc/d08.htm>

<http://iatp.typepad.com/thinkforward/2007/09/beginning-a-chi.html>

### Producer-driven cooperatives:

<http://www.ncga.coop/about>

<http://www.familyfood.net/overview.html>

**Alison Edwards** “As value chains develop, they promote efficient markets that share information and proceeds equitably among all players in the food chain. This will lead to a food system filled with businesses where power and market share are more equally distributed among links in the food chain as well as among actors at each level, with cooperation, partnership and information—where sharing is the norm rather than the exception.”

# SMART LOCALISM



The local food movement has burst on the scene with concerns about reducing the ecological footprint of food. But even as debates rage about whether local food really is more sustainable than food flown from the opposite side of the world, a new kind of smart localism is emerging—flexible, networked, sophisticated, and bigger than food.

## WHAT TO WATCH

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- The hundred-mile diet & the hundred-yard diet
- Guerilla farming
- Agritourism
- Vertical farming
- Water wars

A veritable ecosystem of issues is evolving at intersection of sustainability and local food. Anxieties over food miles, unsustainable food production, and food safety have fostered a thriving local food movement. But this movement finds synergy with other community-focused innovations—including regenerative local commerce, community identity, protection of the small American farmer, urban sustainability, and public health.

Over the last few years, interest in local food systems has been clearly on the rise in local planning. Planners use growth management strategies to preserve farm and ranch land. Economic development planners support the revitalization of main streets with traditional mom-and-pop grocery stores. Transportation planners create transit routes connecting low-income neighborhoods with supermarkets. And environmental planners provide guidance to peri-urban farmers to avoid adverse impacts on lakes and rivers.

Food and food production will increasingly be used to deepen a sense of place and regional identity, building market opportunities and generating demand for both unique and staple products. This food-based localism will support local economic development, new initiatives in landscape-scale environmental stewardship, and a new level of understanding of how natural systems work in and at the edges of urban life.

## FORECASTS:

- Food footprinting will help local diets evolve to include an informed blend of locally sustainable food products and globally sourced products that emphasize fair trade and low environmental impact.
- Peri-urban and urban farming will grow in importance as developers strive to meet green standards for new community development and urban re-development alike.
- As water becomes an increasingly scarce resource, local food production will be linked to issues of local water rights—and large-scale projects to transport water to distant users will become increasingly contentious.

# SMART LOCALISM

Source: [www.buylocal.ca.org](http://www.buylocal.ca.org)



The Buy Fresh, Buy Local Campaign helps consumers find and choose local products while building relationships among growers, food artisans, farmers' markets retailers, restaurants, and institutions.

Dickson Despommier of Columbia University's Vertical Farm Project seeks to integrate sustainable agriculture into urban infrastructure in the form of skyscraper-like indoor farms—capable of feeding 50,000 people on a diverse “local” diet grown on a city block.



Source: <http://www.verticalfarm.com/Designs.aspx>

## OTHER RESOURCES:

### Local food and local diets:

<http://www.localflavourplus.ca/>

<http://100milediet.org/home/>

<http://www.worldchanging.com/archives//007213.html>

### Guerilla farming:

[http://www.treehugger.com/files/2005/06/guerrilla\\_garde.php](http://www.treehugger.com/files/2005/06/guerrilla_garde.php)

**Emily Gertz** “The idea that eating from an industrial and nationally- or internationally-distributed food system could be dangerous, and that eating local meant preparedness, pulled more people in the local camp, and pulled the local issue closer to the mainstream.”

# TECHNOFIX



Faced with collapsing food webs, the biotechnology community has some genetic engineering solutions to offer—from next-generation genetically engineered seeds to artificially produced meat. Underlying this technological fix is the so-called Carlson Curves that suggest a kind of Moore’s Law for gene-based technology.

## WHAT TO WATCH

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- New crops for climate-endangered areas
- Developing world initiatives in genetic engineering
- Ink-jet cultured meat
- Self-protecting plants

In a paean to technological solutions, Freeman Dyson recently wrote about “Our Biotech Future,” foretelling a “domesticated” biotechnology that will become the plaything and art form of “housewives and children,” that “will give us an explosion of diversity of new living creatures, rather than the monoculture crops that big corporations prefer,” and will solve the problem of “rural poverty.”

Even without Dyson’s optimism about biotechnology’s rush to rescue the global food web, it is clear that genetic engineering will play a role in how the world adapts to the impacts of climate change and millions more mouths to feed. New varieties of rice are being engineered to perform better in drought or floods. Developing regions of the world are creating their own “seed acts” to legislate local research—and local profits—for genetically improved seeds suited to their specific needs. Some researchers even anticipate laboratory-grown meat—using ink-jet printing.

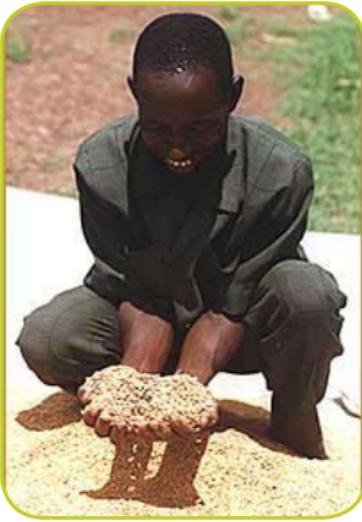
The issues here are larger than simply putting food on the table. Nicholas Kristof of the *New York Times* notes that, “Perhaps the most important and complex decision in the history of our species is approaching: in what ways should we improve our genetic endowment?”

## FORECASTS:

- The next generation of genetically engineered foods will not be controlled by a few lead players with headquarters in the West. Whether they favor open-source biotech or local patents for local innovations, developing nations will be among the leaders in biotech innovations.
- The debate between technological fixes and sustainable restoration will continue, but it will likely become more sophisticated and nuanced as blends of technology and restorative policies provide innovative solutions.

# TECHNOFIX

Source: <http://www.un.org/ecosocdev/geninfo/afrec/vol17no4/174rice.htm>



Developed by Dr. Monty Jones of the West Africa Rice Development Agency (WARDA), NERICA is a hybrid strain of rice that is highly resistant to drought and local pests and also has yields 2-3 times those of standard rice varieties.

Advances in both ink-jet-type printing technology and biochemistry could be used to produce “cultured” meats with the same taste, nutrients and texture of “real” meat.



Source: [http://openthefuture.com/2006/12/bioprinters\\_vs\\_the\\_meatrix.html](http://openthefuture.com/2006/12/bioprinters_vs_the_meatrix.html)

## OTHER RESOURCES:

### The genetic engineering debate:

<http://www.worldchanging.com/archives//007302.html>

<http://www.nybooks.com/articles/20370>

<http://www.nybooks.com/articles/20612>

**Emily Gertz** “The debate between techno-utopians and more traditional community and farm advocates is about as contentious as the one about whether meat-eaters can really be environmentalists ... The split is likely to intensify thanks to the growing power of genomic science, the impoverished state of science education, and policy in the United States.”

# EXTREME PLANNING



With the accelerating pace of climate change and ecosystem collapse, food web management may be supplanted by a kind of sustainability triage—preparing for the worst. Such preparations will range from seed vaults to frozen zoos in a kind of emergency biosphere backup.

## WHAT TO WATCH

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- Seed vaults
- Frozen zoos
- Disaster recovery-in-a-box

In the global ecology we've created, today's food web is frighteningly delicate. It's fraught with complex interdependencies, unanticipated thresholds, and the potential for cascading failures. Pandemics, predator/prey disruptions, over-farming and over-fishing, weather changes—all of these can tip a delicate balance unexpectedly. Preventing the worst effects of such failures and being able to respond quickly to mitigate disaster have become the focus of several institutions.

Key strategies for these extreme planners are developing a capacity to restore damaged systems. Norway's Svalbard International Seed Vault reflects the spreading sense of urgency about protecting our agricultural heritage. Unlike other seed banks, in which seeds rotate in and out, this is truly a vault, where the millions of seeds will be essentially locked in and frozen, safeguarding a blueprint of almost every agricultural crop in the world. In Australia, the Animal Gene Research and Storage Center of Australia (AGSRCA) has created a frozen zoo to preserve reproductive cells, (semen, embryos, ovaries, etc.) and genetic material in a frozen state, at  $-196^{\circ}\text{C}$  in liquid nitrogen—effectively creating “a gene bank for rhinos, elephants, hairy-nosed wombats, bilbies, and 100 other species.”

## FORECASTS:

- The acceleration of climate change effects is likely to spur more storage programs—as well as research into how to restore severely damaged ecologies.
- Climate-change driven diseases may destroy specific crops, requiring the restoration of agricultural lands using protected seeds.
- Future debates are likely to arise around the use of “biosphere backups”—who gets to make the decisions about when to tap them and for whom?

# EXTREME PLANNING

Source: [http://agsrca.srivilasa.com/frozen\\_zoo.htm](http://agsrca.srivilasa.com/frozen_zoo.htm)



AGRSCA has established a frozen zoo “to guarantee the survival of endangered species”—a latter-day Noah’s ark.

Built into a mountain near the North Pole, the Svalbard International Seed Vault, supported by the Global Crop Diversity Trust and the Norwegian government, opened in early 2008.



Source: <http://www.seadvault.no>

## OTHER RESOURCES:

### Seed vault:

<http://www.newscientist.com/article.ns?id=mg18925343.700>

<http://www.worldchanging.com/archives//003993.html>

<http://www.worldchanging.com/archives//006042.html>

**Sarah Rich** “The [seed vault] project reflects the spreading sense of urgency around disaster preparedness and food security, and the more widespread understanding that climate change is real, is occurring rapidly, and poses a very serious threat to life on earth ... In the event of a total crop wipe-out, we’ll be able to replant and rebuild a food supply.”

# FOOD ECOSYSTEM MANAGEMENT



Threats to the food web may become the catalyst for a new management paradigm—not only for managing our food systems but also our human communities and even our global ecology. This paradigm will be based on ecoscience at the landscape scale and may ultimately reorganize our political systems around landscape ecologies.

## WHAT TO WATCH

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- Bioregional planning and regulation
- Food web modeling tools
- Watershed management

Food webs are part of a global ecosystem that has been so disrupted that, as ecologist Daniel Janzen argues, “There’s no footprint-free world.” He goes on to argue that nothing is wild any longer: it’s all gardening now and humans are the gardeners. The question is, how do we garden on such a large scale? At least one answer to this question is ecosystem-based management.

Ecosystem-based management is a paradigm that has three key tenets: natural resources require cross-border management; they must be managed for integrity and resilience rather than for specific ecosystem services to specific economic and social systems; and management policies must be continuously monitored for iterative adjustment.

Approaching the management of food webs from this point of view means developing tools to reveal the complex interconnections and using those tools much the way that we use economic indicators today to manage our economies. It means that, increasingly, food issues will drive policy decisions for everything from local ecologies of businesses to transnational agreements about resources. In the end, it may require a new global governance infrastructure focused on bioregions rather than political geographies.

## FORECASTS:

- A new alliance of NGOs, local and regional governments, and farmers will evolve to create new policy and decision-making structures for managing food webs and the ecosystems they define.
- Food web modeling—including virtual world simulations—will increasingly be used to identify food web interdependencies and vulnerabilities, and to craft policies for intervening in food webs.

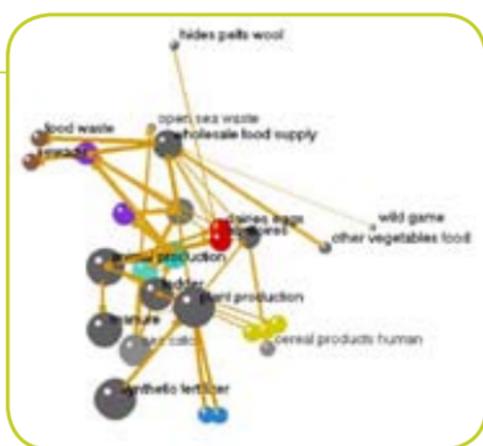
# FOOD ECOSYSTEM MANAGEMENT

Source: <http://www.nycwatershed.org/index.html>



The New York City Watershed Agricultural Council—a non-profit organization supported by the city, the USDA Forest Service, and other agencies—is an example of an ecologically integrated approach to maintaining an agriculturally productive landscape by managing a watershed as a ecological system.

This network model of nitrogen flows in Norway shows how a complex nutrient cycle can be modeled to understand human impacts within an ecology and ultimately to inform policy decisions.



Source: <http://core.ecu.edu/BIOL/luczkovichj/russia/luczkovich/luczkovich.htm>

## OTHER RESOURCES:

### Virtual modeling of ecosystems:

<http://www.conbio.org/cip/article44VIR.cfm>

### “It’s all gardening now”:

<http://www.sciencemag.org/cgi/content/full/279/5355/1312>

**Alison Edwards** “These new agricultural and resource management practices cannot be done in siloed or isolated efforts—they require new forms of collaboration. This work combines implementation of landscape-level restoration efforts, natural systems farming research, and the community spirit of farmers’ markets and local watershed stakeholders groups. This collaboration is indicative of the whole systems innovations needed to move our food system towards sustainability.”

# NEW STRATEGIES FOR DEVELOPMENT



Inclusive or universal design principles have begun to involve people with disabilities in designing a world that's more accessible and user-friendly for everyone. As new collaborative, lightweight platforms for design and manufacturing emerge, they will increasingly become lead innovators as well as lead users.

## WHAT TO WATCH

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- Open-source design platforms
- DIY manufacturing
- Inclusive design
- Open virtual worlds and games

New platforms are creating an environment where people with disabilities can work together to build new tools, define new design approaches to the world, and experiment with social processes. Open-source platforms for assistive technology software, for example, not only make assistive tools more accessible and accelerate innovation; they also provide a forum for people with disabilities to meet one another and engage directly in developing the tools they need.

New do-it-yourself manufacturing and distribution platforms also change the path to developing and marketing innovative products for small initial markets. Already accustomed to “tinkering” with the world to make it work for them, people with disabilities may be unanticipated users of sites like Ponoko, for example, which builds products one-off from user designs. The Ponoko model suggests a low-cost way to come up with innovative solutions for smaller markets.

## FORECASTS:

- Inclusive design, combined with user-centered design, will involve more people with disabilities in the process of designing everything from phones to public spaces.
- Online worlds and game spaces will be places not only for experimenting with novel interfaces to the virtual world but also for exploring new social processes that follow the principles of inclusive design.

# NEW STRATEGIES FOR DEVELOPMENT

Source: <http://www.oatsoft.org/>



OATSoft is an open-source development platform dedicated to making it easy for people to find and co-create open-source assistive technology software.



Ponoko is an online site that builds products one-off from user designs. Users can buy, sell, create, and customize through the site.

Source: <http://www.ponoko.com/makeandsell>

## OTHER RESOURCES:

### Disabilities in virtual worlds:

<http://wheelieatholic.blogspot.com/2007/05/my-personal-choice-to-use-wheelchair-in.html>

**Marko Popovic** “Many great innovations, benefiting entire humanity, originated from addressing the needs of disabled people. This trend will certainly continue in future. Probably the most important paradigm shift on those lines nowadays is development of the neural interface technologies linking artificial devices with our own CNS [central nervous system].”

# NEW COGNITIVE HORIZONS



As neuroscience reveals more and more of the brain's secrets, tools for enhancing our cognitive abilities—especially our ability to control our environment with our minds—will evolve side-by-side with advocates for neurodiversity. The result will ultimately be new measures of intelligence and a broader spectrum of cognitive experiences for everyone.

## WHAT TO WATCH

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- Neural interfaces
- Cognitive diversity movements

The brain is becoming the site for perhaps the most far-reaching innovations in the history of human technology—and people with disabilities are at the center of this innovation. A hot spot of innovation here is, of course, the brain-machine interface. Powerful assistive technologies for people with limited motor abilities will lay the groundwork for a broad spectrum of applications for mind-controlled devices. At the same time, neuro-diversity is emerging as a banner cause for people with cognitive differences. Autism, for example, is seen as a type of personality, rather than a pathology.

These trends raise issues of ethics and civil rights. Health care, disability, and reproductive rights activists have all argued that access to technology empowers full and equal participation in society. As Dr. Anne Corwin points out, “On the same grounds, a generalized right to ‘technological empowerment’ might connect defenders of enhancement technologies with disability activities, reproductive rights activists, would-be parents seeking fertility treatments, the transgendered aesthetic body modifiers, drug policy reformers, and anti-aging researchers.”

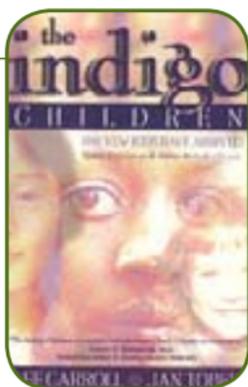
## FORECASTS:

- People with disabilities will be the lead users for brain-machine interfaces, providing much of the early testing and feedback and suggesting possible alternative uses.
- As people engage with neural interfaces and other kinds of cognitive enhancements, the definition of normal cognitive functioning will become much more complex—and the consequences will ripple through our educational and cultural systems.
- As neuroscience maps the diversity of cognitive functioning in the population, it will become increasingly possible—and perhaps desirable—to try out the experiences of people with cognitive disabilities, such as autism.

# NEW COGNITIVE HORIZONS

Source: <http://www.cyberkineticsinc.com/content/medical-products/braingate.jsp>

The BrainGate system, designed to restore functionality for severely motor-impaired individuals, has recently been approved for clinical trials. Control may extend beyond typical computer functions to include the control of objects in the environment, such as a telephone, a television and lights.



The neurodiversity movement finds one expression in the New Age concept of “Indigo children,” who have different cognitive styles, often including paranormal abilities. Some autistic youth self-identify as Indigo children.

Source: <http://www.indigochild.com/>

## OTHER RESOURCES:

### Neuro-enhancement:

<http://www.appneurology.com/showArticle.jhtml?articleId=184417512>

Brain-Machine interface

<http://www.neuralsignals.com/>

<http://www.innovationwatch.com/choiceisyours/choiceisyours.2006.11.30.htm>

<http://www.msnbc.msn.com/id/19368036/>

### Ethics of enhancement:

<http://ieet.org/index.php/IEET/HETHR>

**Anne Corwin** “The key here is ... an acknowledgement that the best ways to make the world better are those that promote choice and self-determination, rather than those that encourage homogenization of the population ... The autistic rights movement, as well as being formidable unto itself, is a harbinger of the kinds of civil rights discussions that are likely going to become more and more prominent as concepts of what is fixed and what is malleable in terms of ‘human nature’ destabilize further and further as a result of transformative technology.”

# NEW MODES OF SENSING



Assistive technologies for people with disabilities are leveraging new sensory technologies that translate data into multi-sensory experiences. These technologies will begin to permeate the larger marketplace, creating a trans-sensory world—a kind of technological synesthesia that provides new multi-layered experiences of information and the world it describes.

## WHAT TO WATCH

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- Neural interfaces
- Haptic interfaces
- Customized sensory products
- Trans-sensory civic spaces
- Trans-sensory art

New assistive technologies are translating text to sound, colors to music, or electronically “touch” people at a distance. For people with disabilities, this means access to otherwise inaccessible data, particularly complex scientific or quantitative data and imagery such as maps and graphs. For the population at large, it means new choices about how to experience information, the visible world, and even human contact.

Many of these tools will be developed not only for but by people with disabilities. For example, Dr. Sile OModhrain, of Queen’s University, Belfast, is blind. She’s developing tools for translating visual media and data into touch feedback. While her primary goal is to bring a richness of media experience to scientific and technical information, she anticipates that the technology could translate into a mobile phone that you could squeeze to send a sensation of touch to a friend. Victor Wong, a Cornell graduate student who lost his sight at 7 years old, is likewise working with a team of undergraduates on an application that translates color into musical notes—allowing him “read” maps of ionosphere in which color represents variables such as electron density and light intensity

## FORECASTS:

- As individuals are able to experience the world through selective sensing, a range of products and services will create customized sensory experiences—allowing people to shut off certain senses and open others (at events, in public spaces, at work) to create personal and custom environments.
- Public spaces, schools, local government, libraries, and health centers will be designed for full inclusion, and activities such as voting, public hearings, education, and health will be less oriented to single-sensed citizens.
- New ways to interpret and communicate data and ideas will lead to new insight and a new trans-sensory knowledge.

# NEW MODES OF SENSING

Source: [http://www.news.cornell.edu/chronicle/05/1.27.05/Wong\\_map\\_software.html](http://www.news.cornell.edu/chronicle/05/1.27.05/Wong_map_software.html)



Victor Wong, at Cornell University, developed a software application that translates color into the 88 notes of the piano, ranging from blue at the lower end of the scale to red at the upper end and providing an alternate sensory experience of color-coded information.

Dr. Sile O'Modhrain worked with an MIT MediaLab team to prototype a touch-based information system that combines haptic, visual, and auditory display in a single handheld device that can communicate with other devices.



Source: <http://news.bbc.co.uk/1/low/sci/tech/1940009.stm>

## OTHER RESOURCES:

### Neuroprostheses:

<http://www.appneurology.com/showArticle.jhtml?articleId=184417512>  
[http://www.foster-miller.com/projectexamples/t\\_bt\\_neurophysiology/Neurotrophic\\_Electrode\\_Arrays.htm](http://www.foster-miller.com/projectexamples/t_bt_neurophysiology/Neurotrophic_Electrode_Arrays.htm)

**Anne Corwin** “It is important here to avoid seeing disabled persons as a ‘means to an end,’ since this is always something of a danger when dealing with marginalized groups ... Rather, focusing on the assistive benefits of technology in light of the social transformations it may effect allows a realignment with the idea of human interdependency (with other humans, with machines, and with emerging human-machine hybrids that are likely to become thought of as ‘merely human’ in years to come).”

# NEW STANDARDS OF PERFORMANCE



The proliferation of enhancements—technological, material, pharmaceutical—are enabling new kinds of extended lifestyles, in which the ‘gold standard’ of performance is attainable only through enhancement. These performance enhancements turn disability into super-ability, and increasingly, those without disabilities will seek these better-than-normal tools in order to compete.

## WHAT TO WATCH

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- Functionality-over-normality
- X-people lifestyles
- Assistive feedback

Each major technological innovation rewrites existing practices, protocols, and expectations. Those who don’t integrate the new tools—automobiles, computers, cell phones, for example—move to the fringes as the mainstream gets redefined. Adaptive and assistive technologies are about to create this kind of pressure.

A number of new technologies are gradually challenging the stigma of prosthetics, for example. South African sprinter Oscar Pistorius was recently banned from participating in the Olympics. Why? He’s a double amputee with two prosthetic legs that were ruled to give him an unfair advantage over fully limbed athletes. With his prosthetics, he could run faster than similarly talented athletes with normal (and less efficient) legs.

Similarly, analeptics developed for people with central nervous system disorders have become increasingly prevalent on college campuses, spurring students to fake ADHD diagnoses to obtain prescriptions, then distribute, and often sell, pills to other students. Students interviewed about using Aderall say things like “I don’t think I could keep a 3.9 average without this stuff.” Or “The culture here actually encourages people to use stimulants.”

## FORECASTS:

- As enhancements become more varied, more extreme, and more prevalent, the performance expectations for different kinds of jobs will become more complex—driving new kinds of human resources issues in the workplace.
- The boundaries of legal enhancements will be increasingly challenged—both by new technologies and new applications of those technologies—rewriting the rules for everything from sports and education to manual labor and military action.
- As enhancements provide distinct functional advantages, standards of social acceptance will shift from focusing on “normal” to focusing on what’s functional.

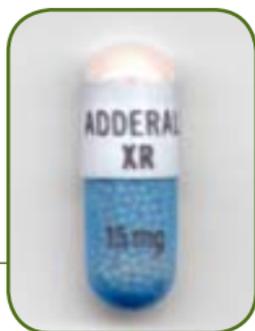
# NEW STANDARDS OF PERFORMANCE

Source: <http://blog.wired.com/wiredscience/2007/07/measuring-the-a.html>



The Cheetah prosthetics developed by Ossur have given South African sprinter Oscar Pistorius what has been deemed to be an “unfair advantage” over runners with two natural legs.

Analeptics like Adderall were developed for people with central nervous system disorders, but are now widely used on college campuses to boost attention and cognitive functioning for better test performance.



Source: <http://www.nytimes.com/2005/07/31/education/edlife/jacobs31.html>

## OTHER RESOURCES:

### More on Pistorius:

[http://en.wikipedia.org/wiki/Oscar\\_Pistorius](http://en.wikipedia.org/wiki/Oscar_Pistorius)

<http://scienceofsport.blogspot.com/2007/07/oscar-pistorius-science-and-e...>

<http://www.ossur.com/?PageID=3547>

### Enhancement drugs:

<http://www.nytimes.com/2005/07/31/education/edlife/jacobs31.html>

### Transhumanist choices:

<http://autisticbfh.blogspot.com/2007/07/on-cyborgs-cures-and-choices.htm...>

[http://en.wikipedia.org/wiki/Social\\_model\\_of\\_disability](http://en.wikipedia.org/wiki/Social_model_of_disability)

**From the “Whose Planet Is It Anyway?” blog** “As I see it, both neurodiversity and transhumanism are primarily about self-determination ... I am asserting that cognitive diversity is beneficial to the human species, just as other forms of diversity are valuable, and that people should never be forced to conform to some arbitrary concept of the ideal brain (whatever that might be) or treated as second-class citizens if they do not.”

# NEW PATHS TO ADOPTION



If people with disabilities are lead users for more and more innovations, who are the fast followers who will build the markets? In an experience economy, they may be people who are looking for new experiences of their bodies and minds—and can leverage disabilities solutions to take them to places they’ve never gone before.

## WHAT TO WATCH

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- Long-tail marketing
- Aging baby boomer market
- Experience economy

While people with disabilities may be lead users, they are not necessarily a small market. According to a New York City study of universal design, “Using the broadest category of functional limitations ... more than 50% of the U.S. population could be characterized as having diminished abilities.” In addition, the large cohort of baby boomers is already beginning to experience steep declines in functionality. People with severe disabilities may flag the need, but this larger population will benefit from their solutions.

At the same time, online environments have changed the path for adoption of niche offerings. As Chris Andersen has noted, online markets more easily serve the “long-tail” of the market—those who seek more specialized goods and services. Online design, manufacturing, and distribution platforms will push innovations by and for people with disabilities out to these long-tail markets.

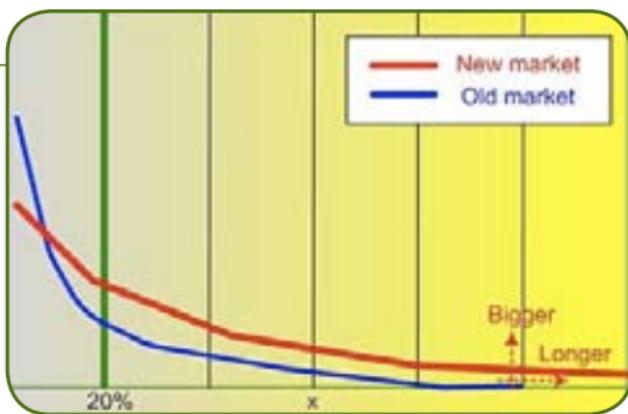
Perhaps most important, though, is the continuing evolution of the experience economy. With innovations in cognitive enhancements, novel trans-sensory tools, and new standards of performance, people will actively seek the new experiences that emerge from addressing the needs of people with disabilities.

## FORECASTS:

- People with disabilities will increasingly function as a diaspora with a positive, assertive identity that leverages online tools—especially social software—to self-define as a robust market segment.
- The portion of the population with some kind of functional limitation will grow rapidly as baby boomers age—and this population will become both innovators in addressing these functional limitations and markets for products developed for specific disabilities.
- Simulated experiences of disability will become a “practice ground” for an aging population—and influence choices about everything from buying cars (or not buying them) to remodeling kitchens for old age.

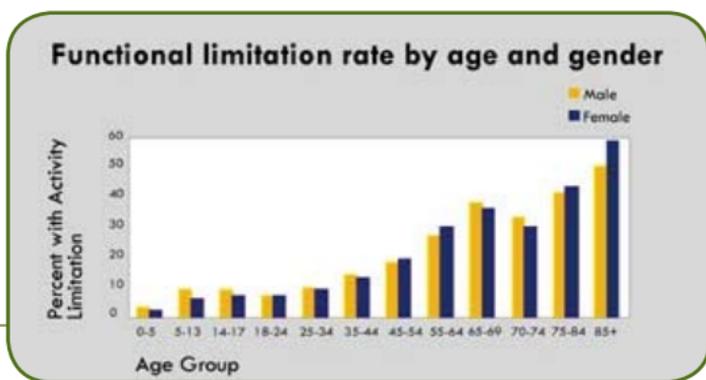
# NEW PATHS TO ADOPTION

Source: [http://en.wikipedia.org/wiki/The\\_Long\\_Tail](http://en.wikipedia.org/wiki/The_Long_Tail)



Online platforms have been shown to support marketing to the long-tail more effectively than brick-and-mortar retail. Online design, one-off manufacturing, and one-to-one distribution may leverage the same effect for disabilities innovations.

Everyone tends to lose functional capacities as they age—activity limitation is 38.8% for the population 65 years or over and it rises to 56.6% for those 85 or over. This is thus a graph of the future market for disabilities solutions, broadly speaking.



Source: <http://www.ap.buffalo.edu/idea/udny/Section1.htm>

John Cromby and Penny Standen in *“Cyborgs and Stigma: Technology, Disability, and Subjectivity”* “Some decades ago, predictions were commonplace that by the millennium computers and robots would greatly shorten the working week and free humanity from drudgery and mindless labour. That these predictions have proved false is obvious; the more interesting question may be why this is so. In this context, the efforts of people with disabilities to get the applications of technology they most need may parallel, if not actually prefigure, the attempts of us all to acquire innovative new technologies shaped by the needs and aspirations of users ...”

# SUPERHEROES 2.0 SKILLS



Today's digital natives—young people who have never known a world without computers, mobile phones, and the Internet—are growing up with a new set of skills. They are also maturing in a world of unprecedented challenges in the social, economic, and natural environment. Many of them will emerge as superheroes over the next decade, changing the face of organizations.

## WHAT TO WATCH

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- New uses of collective negotiation, group persuasion, and public spectacle
- New kinds of bottom-up surveillance
- Uses of new media to empower eco-citizens
- Growth of ad hoc organizations
- Evolution of the open economy

For the 2007 *Ten-Year Forecast*, Jane McGonigal and Jason Tester developed the Superheroes 2.0 game—an interactive learning process that helps participants understand the new ways of working that are suggested by the 2007 forecast. Among the forecasts were:

- Digital natives and civic spaces: young people are cultivating smart networking skills to create a new participatory culture through the use of open media and peer-to-peer cultural production.
- Do-it-yourself manufacturing: a host of new tools and practices are enabling distributed small-scale manufacturing.
- Financial reforms: with growing environmental uncertainty and heightened social risk, new kinds of financial instruments will provide growing opportunities to manage multiple capitals: financial, intellectual, natural, and social.
- Participatory panopticon: bottom-up surveillance will create a new transparency across organizations, markets, and society as a whole.

These and other forecasts led Jane and Jason to posit a set of Superheroes 2.0 skills that will be the core competencies of effective individuals in the coming decades. See the back of this card for the skills and their definitions.

## FORECASTS:

- Young superheroes will begin to create new kinds of organizations over the coming decades that will leverage Superheroes 2.0 skills—a few of these will emerge out of today's leading organizations.
- Many young people with Superheroes 2.0 skills will not find a way to express those skills in today's organizations—they will take them outside the world of work and leverage them in civic spaces.

# SUPERHEROES 2.0 SKILLS

## SUPERHEROES 2.0 THE SKILLS

### **MOBBABILITY:**

The ability to work in large groups, to organize and collaborate with many people simultaneously.

### **INFLUENCY:**

Knowing how to be persuasive in multiple social contexts and media spaces (each context and space requires a different persuasive strategy and technique).

### **PING QUOTIENT:**

Responsiveness to other people's requests for engagement, and ability to reach out to others in a network.

### **MULTI-CAPITALISM:**

Fluency in working with different capitals (for example, natural, intellectual, social, financial).

### **PROTOVATION:**

Fearless innovation in rapid, iterative cycles.

### **OPEN AUTHORSHIP:**

Creating content for public consumption and modification.

### **EMERGENSIGHT:**

Ability to prepare for and handle surprising results and complexity.

### **LONGBROADCASTING:**

Thinking in terms of higher level systems, cycles, big picture.

### **SIGNAL/NOISE MANAGEMENT:**

Filtering meaningful info, patterns, and commonalities from the massively multiple streams of data and advice.

### **COOPERATION RADAR:**

The ability to sense, almost intuitively, who would make the best collaborators on a particular task.

**Peter Levin** "It is precisely the shift from hierarchy to more collaborative forms of knowledge sharing that has allowed arbitrage desks to sift valuable market opportunities from otherwise chaotic forms of market information. Finding relationships across unlikely forms of expertise are likely to yield high payoffs."

# OPEN LEADERSHIP



Open leadership leverages open systems to tap the vision and capabilities of diverse stakeholders inside and outside multiple organizations.



Leadership is not so much established by hierarchy as by the creation of platforms for eliciting vision, refining it, and mobilizing one another—and ultimately empowering people to act quickly in response to emerging vision.

## WHAT TO WATCH

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- New persuasive media
- Proliferation of digital channels
- Social networking + political organizing

From an organizational point of view, open leadership is not primarily about finding individuals with strong leadership skills but rather about creating the platforms for leadership to emerge, mobilize, and then recede. It is situational: leadership comes from different quarters, given different issues and different goals. It is fostered by creating the tools and processes that allow emergent leaders to recognize an opportunity, align stakeholders across multiple organizations, and then act.

Open leadership is also about transparency. Increased transparency brings multiple stakeholders to bear on the operations, and different stakeholder communities require different communication tactics and platforms—from the smallest scale, like microblogging, to the largest mass media platforms. These communication platforms will continue to layer on top of one another, dispersing responsibility for media management to the “growing edges” of the organization.

## FORECASTS:

- Organizations will use social networking software to surface new leaders—and organizational leadership will depend increasingly on the social reach of its leaders beyond the organization’s boundaries.
- Superhero organizations will integrate diverse public and social media into their organizational functions in order to leverage their social networks across a larger domain of potential workers—for example, by setting up recruiting pages on social networking sites like Facebook.

# OPEN LEADERSHIP

## SUPERHEROES 2.0 SKILLS FOR OPEN LEADERSHIP

### **INFLUENCY:**

Knowing how to be persuasive in multiple social contexts and media spaces (each context and space requires a different persuasive strategy and technique).

### **MULTI-CAPITALISM:**

Fluency in working with different capitals (for example, natural, intellectual, social, financial).

### **LONGBROADCASTING:**

Thinking in terms of higher level systems, cycles, big picture.



Ernst & Young was one of the first companies to use Facebook as a recruiting platform.

[http://www.collegerecruiter.com/weblog/2007/01/ernst\\_young\\_bec.php](http://www.collegerecruiter.com/weblog/2007/01/ernst_young_bec.php)

**Paul Miller** “Presenting information and persuading people within organizations that something should be done differently will be less dominated by seniority. Younger employees will be able to have a dramatic impact by using new tools to communicate their ideas compellingly.”

# SOCIABILITY



As social software creates a pervasive infrastructure of social capital, large groups and extended networks will self-organize, both within organizations and beyond their boundaries, to address issues, solve problems, and deliver new value without extensive logistics organizations or dedicated communications infrastructures. Superheroes will take advantage of efficiencies of coordination, using tools and skills for everything from presence management to identity management.

## WHAT TO WATCH

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- Location management
- Attention management
- Presence management
- Identity management
- Collaborative workspaces
- Social filtering

Sociability in superhero organizations combines advanced skills in social networking with what has been called “articulation work.” Articulation work is the coordinating work of making teams—or even large ad hoc organizations—come together. It can be as simple as setting meeting times and managing updates by various sub-units. Or it can be the work of managing shared resources, and interdisciplinary innovation across departments, across firms, or across interfirm networks.

Large organizational infrastructures are often attempts to support articulation work, which is typically invisible and unrewarded. But new tools for bottom-up coordination, combined with skills like mobility, cooperation radar, and ping quotient, will make it possible for superhero organizations to dispense with a lot of these infrastructures and rely instead on distributed virtual infrastructures (using tools as diverse as Google Docs, Plazes, and Jaiku). For organizations, the challenge will be tracking and influencing this invisible work.

## FORECASTS:

- Social networks will be leveraged to create new kinds of work teams, functional networks, and ad hoc organizations.
- New status markers will emerge in organizations, based on attention, focus, and visibility indicators embedded in social tools.
- Virtual collaborative spaces will be increasingly linked to social networking and identity management platforms.

# SOCIABILITY

## SUPERHEROES 2.0 SKILLS FOR SOCIABILITY

### MOBBABILITY:

The ability to work in large groups, to organize and collaborate with many people simultaneously.

### PING QUOTIENT:

Responsiveness to other people's requests for engagement, and ability to reach out to others in a network.

### COOPERATION RADAR:

The ability to sense, almost intuitively, who would make the best collaborators on a particular task.



SFZero is a collaborative production game. Players build characters by completing tasks for their groups and increasing their score. The goals of play include meeting new people and exploring the city of San Francisco.

Source: <http://sf0.org/>

## OTHER RESOURCES:

### Social microblogging:

<http://jaiku.com/>

### Location and presence management:

<http://plazes.com/>

### Computer Supported Cooperative Work (CSCR):

2006 Conference

2008 Conference

**Peter Levin** "Harnessing coordination work is increasingly important for two main reasons. First, as work requires collaboration across groups who are not necessarily located in the same place (both spatial and temporal), articulation work becomes more critical. And second, as articulation work becomes more embedded in technology, it will take a sharper vision to see how articulation work happens and how to influence it."

# COLLECTIVE SENSEMAKING



Teams and networks are increasingly using bottom-up tools to discover patterns in large complex systems—and to trigger rapid responses. Superhero organizations will nurture diverse ecologies of these systems, inside the organization and out, to uncover emergent problems and opportunities and to mobilize innovative solutions.

## WHAT TO WATCH

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- Collective filtering tools
- Social bookmarking
- Social software simulations
- Orders of worth

Among the most powerful innovations in knowledge work over the past five years have been the tools for collective sensemaking: social bookmarking tools that allow groups to share their perspectives on the world of Web information; collective filtering tools that use participant rating to surface the most important new contributions to a knowledge collection; and the use of gaming platforms for collective problem solving. These tools continue to evolve rapidly.

They also create ad hoc ecologies of knowledge and sensemaking, linked to the social networks of the people who use them. To tap these diverse ecologies, superhero organizations will increasingly move from hierarchical structures to heterarchy—networks of actors in which each member shares the same “horizontal” position of power and authority, with overlapping, multiple roles. A key function of the organization is providing the meta-views of these ecologies of sensemaking and measures of the value they are creating. And one of the challenges of these measures is to link them to changing “orders of worth”—the justifications that the organization and its members use to make choices.

## FORECASTS:

- Collective sensemaking will forge a parallel path to datamining, providing key platforms for superhero organizations to build divergent identities, products, and services.
- Innovative organizations will map collective sensemaking tools and networks as a way to discern self-organizing groups and opportunities within the organization.

# COLLECTIVE SENSEMAKING

## SUPERHEROES 2.0 SKILLS FOR COLLECTIVE SENSEMAKING

### SIGNAL/NOISE MANAGEMENT:

Filtering meaningful info, patterns, and commonalities from the massively multiple streams of data and advice.

### EMERGENSIGHT:

Ability to prepare for and handle surprising results and complexity.

### LongBROADING:

Thinking in terms of higher level systems, cycles, big picture.



Source: <http://worldwithoutoil.org/>

*World Without Oil* was an online game designed to harness the collective intelligence of gamers and apply it to a serious global problem. Players worked from a shared “alternate reality dashboard” to create fictional first-hand solutions and propose real-world solutions.

## OTHER RESOURCES:

### Collaborative filtering sites:

<http://reddit.com/>  
<http://digg.com/>

### Social bookmarking:

[www.stumbleupon.com](http://www.stumbleupon.com)  
<http://www.simp.com>

### The use of social software in simulation:

<http://www.geosimulation.org/crowds/>  
<http://www.csmonitor.com/2007/1105/p09s01-coop.htm>

### Orders of worth:

[http://en.wikipedia.org/wiki/Luc\\_Boltanski](http://en.wikipedia.org/wiki/Luc_Boltanski)

**Jane McGonigal** “Despite stereotypes of antisocial gamers who prefer to consume rather than create, most video-gamers are in fact engaged in a highly collaborative effort to exhaustively understand their favorite games. The video-gaming community is, quite simply, engaged in intense and highly successful “collective intelligence.”

# TRANSLITERACY



Transliteracy is the ability to read, write, and interact across the diverse set of media and organizational platforms that are emerging today. It is the capacity to communicate effectively through print, online text, video and audio platforms, and even digital social networks like Facebook. As such, it's a core competency of both superhero organizations and their members.

## WHAT TO WATCH

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- Proliferation of digital video sites and platforms
- New webcasting and podcasting channels
- Blogging and photosharing
- Blended reality mashups

As media are democratized—by easy-to-use tools and open Internet channels—advantages go not to those who own the channels but those that can use the channels most effectively. Organizations have traditionally managed these channels separately through professional agents, but in the emerging world of transliteracy, they will need to leverage the skills of digital natives in diverse positions and functions to craft their own distinctive culture of transliterate communication styles and platforms.

The challenge here will be the rapid evolution of these media and the platforms that support them. Moving quickly from platform to platform—for example, from e-mail to IM to Facebook—digital natives are constantly reinventing the media culture itself, often deliberately evading colonization by professionals. At the same time, the tools themselves are creating new and more complex opportunities for mixing and matching analytical and creative or visual skills, with the evolution of blended realities in which video, animation, and text messaging increasingly overlay the physical world.

## FORECASTS:

- Digital video content will proliferate and be accessible through multiple channels—including a growing number of video aggregators who target specific interests, such as food or health.
- Blended realities will extend the presence of transliterate organizations into multiple niches of everyday life, as people navigate the layers of virtual and physical reality.

# TRANSLITERACY

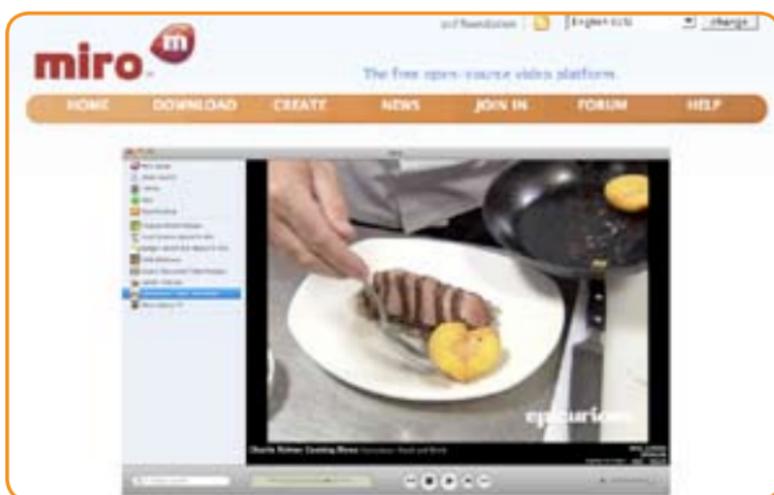
## SUPERHEROES 2.0 SKILLS FOR TRANSLITERACY

### **INFLUENCY:**

Knowing how to be persuasive in multiple social contexts and media spaces (each context and space requires a different persuasive strategy and technique).

### **OPEN AUTHORSHIP:**

Creating content for public consumption and modification.



Source: <http://getmiro.com/tv/food/>

Miro is an open-source video platform that provides multiple online video channels, delivering topic-specific content. This is Miro's food channel.

### **OTHER RESOURCES:**

#### **Online video aggregation and filtering:**

<http://tv.boingboing.net/>

#### **Personal YouTube channels:**

<http://www.youtube.com/YourExtraordinaryJoe>

#### **Blended reality:**

<http://www.metaverseroadmap.org/>

<http://metaversatility.com/>

**Paul Miller** “The generation now entering the workforce knows much more about technology but learned it all outside of school or formal training. For them, using iMovie or keynote or garageband is intuitive rather than formally learned. So younger people don't know the rules of bad Powerpoint—they will find the best way of communicating an idea or information without necessarily knowing how these things 'should' be done.”

# BETA BUILDING



Superheroes 2.0 skills and work practices turn organizations inside out. They build on transparency, collaborative innovation, and rapid iteration. The result is that everything is always in beta—including organizational processes.

## WHAT TO WATCH

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- DIY platforms
- Mashup platforms
- Microblogging

Several trends are contributing to the evolution of a beta organizational culture. Open development platforms for both hardware and software have led to an emphasis on continuous collaborative innovation. The growth of do-it-yourself platforms—from online instruction sites to actual DIY online manufacturing sites—have created an environment for collaborative design and customization. And pervasive media have created a culture of ever-increasing transparency, in which the new superheroes don't hide behind secret development processes and formal rollouts, but rather show their stuff at every step in the process.

What sort of organization takes the best advantage of this beta culture? It's probably an organization that fosters cooperative processes and platforms; it builds on open systems and offers its own open products and services; and it treats its own customers as co-producers, providing opportunities for customization. Finally, it turns transparency to its advantage, leveraging collective sensemaking to build on information that might previously have been considered sensitive, proprietary, or confidential.

## FORECASTS:

- Superhero organizations will redefine basic product cycles and manufacturing processes to take advantage of distributed producers and new lightweight manufacturing infrastructures.
- A bottom-up regulatory environment will emerge in which collective monitoring and pervasive commentary provide swift feedback to organizations—and engage their complex networks in protovation to actively resolve problems and conflicts.

# BETA BUILDING

## SUPERHEROES 2.0 SKILLS FOR BETA BUILDING

### PROTOVATION:

Fearless innovation in rapid, iterative cycles.

### OPEN AUTHORSHIP:

Creating content for public consumption and modification.

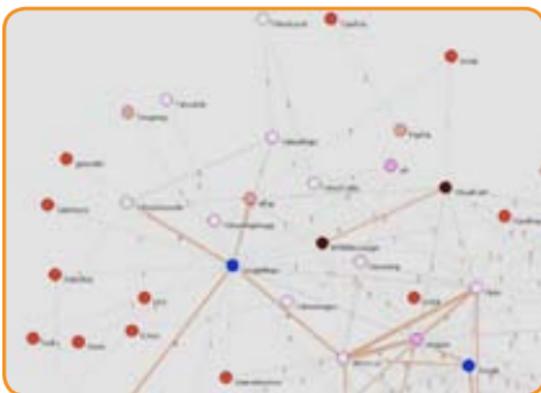


open your api today



ProgrammableWeb is an online community for people who are building mashups and Web 2.0 APIs—it has a database of over 500 open web APIs and thousands of applications people have built with them.

Source: <http://www.programmableweb.com/mashups>



Bala Iyer and Venkat Venkatraman at Boston College posit that application development has evolved from structured programming to

object-oriented development to components to mashups. This graph shows the pattern of mashups built on Google applications.

Source: [http://www.softwareecosystems.com/Winter\\_bootcamp\\_presentation.swf](http://www.softwareecosystems.com/Winter_bootcamp_presentation.swf)

## OTHER RESOURCES:

### DIY platforms:

<http://www.instructables.com/>

<http://www.ponoko.com/about/thebigidea>

**Peter Levin** “The challenge to protovation comes not just from failure, but from success. Organizations that wait for the crisis are already going to be behind.”

# KRYPTO-NUMERACY



In the organizational equivalent of kryptonite—the element that weakens Superman’s superpowers—kryptonumeracy is the misuse of automated quantification and visualization to undermine organizational flexibility. While Superhero 2.0 skills are evolving to deal with challenges from extreme environments, supercrunchers are using deep pools of data and sophisticated statistical analyses to override human judgment.

## WHAT TO WATCH

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- Automated stock trading
- Evidence-based medicine
- Standards-based education reform
- Mandatory sentencing guidelines
- Risk models in law enforcement

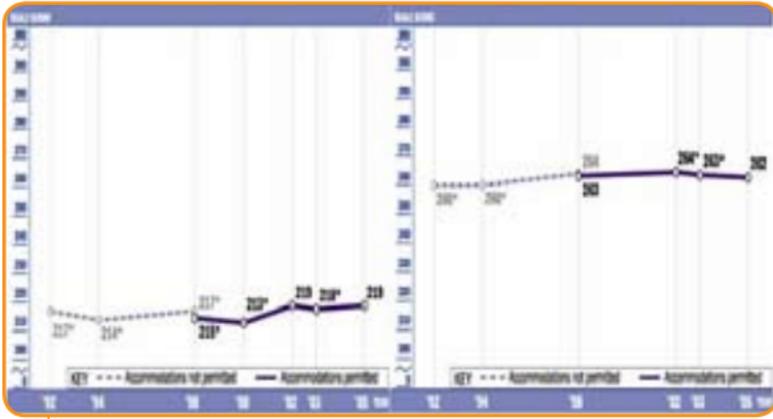
Superhero skills keep humans relevant in complex environments, but they have a delicate relationship with quantification and the rapid growth of deep data. For a small number of knowledge workers—most notably in financial services—intense quantification has co-existed with serious intuition and professional skill. However, in many other professional environments, the growth of sophisticated quantitative tools—and more generally the growing data-intensity in knowledge work—has led to deskilling of professionals.

If Superhero 2.0 skills are all about distributed intelligence and decision-making, krypto-numeracy is about centralized decision-making by-the-numbers. As *Newsweek* recently noted, “Increasingly, jobs that used to call for independent judgment, especially about other people, are being routinized and dumbed down. Banks no longer care about a loan officer’s assessment of whether a borrower is a good risk; everything they need to know is in the numbers.” In addition, decision-making by-the-numbers tends to invite gaming of the data—whether that data is test scores or measures of medical effectiveness.

## FORECASTS:

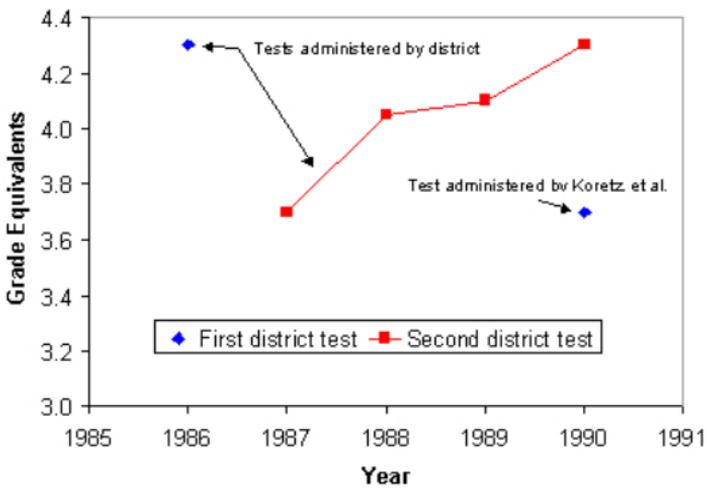
- As sensor data and pervasive monitoring grow, more and more domains of decision-making and management will attempt to standardize decision making using statistical analyses.
- As data visualization processes become more sophisticated and ubiquitous, visual displays will increasingly mask the complexity of the data and make it more difficult—not less—for humans to assess the meaning in the numbers.

# KRYPTO-NUMERACY



<http://nationsreportcard.gov/>

Reading scores did not improve significantly under the No Child Left Behind test-score driven curricula, with measurable results beginning in 2003.



Source: <http://www.gse.harvard.edu/news/features/koretz10012002.html>

Analysis by Harvard professor Daniel Koretz showed how a district in a state that used test scores to evaluate school performance adapted their tests to improve scores—and overstate performance. Effectively, schools, teachers, and districts are motivated to game the scores.

## OTHER RESOURCES:

### Deskilling professional knowledge workers:

“How Data Mining is Replacing Intuition,”

Newsweek, September 3, 2007.

[http://www7.nationalacademies.org/cfe/Stuart\\_Elliott\\_Paper.pdf](http://www7.nationalacademies.org/cfe/Stuart_Elliott_Paper.pdf)

**Peter Levin** “More processing power is being thrown at financial markets, creating a spiral of demand for more quotes, more information, faster processing power. Decision-making is being more rationalized, not in the sense of being more rational, but in the sense of being more routinized and subjected to mathematic procedure.”

# PERSONAL SUSTAINABLE ECOLOGIES



In the midst of an energy crisis, how do we avoid wasting power at home while staying comfortable? In the face of invisible environmental pollutants, how do we make choices about which route to jog or which foods to buy? Pervasive computing will make the invisible visible in our local environments, which could help us make individual choices that add up to large-scale sustainability.

## WHAT TO WATCH

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- Home resource monitoring
- Hypermiling
- SMS environmental feeds
- Wearable health monitors
- Personal footprint tools

Each of us lives in a personal ecology defined by our homes, our workspaces, our communities, and our activities. While the last 50 years of technological innovation have made these ecologies more convenient and comfortable, technology in the next 50 years will attempt to make them more sustainable.

For example, to increase energy efficiency and cut the cost of keeping cool, University of California, Berkeley researchers are bringing electronic brains into our home's electrical systems. Sensors the size of Reese's Cups monitor the temperature throughout the living or work space and relay the data to a networked smart thermostat, which adjusts the cooling to maximize comfort while avoiding over-cooling certain areas.

Meanwhile, personal wireless sensing will accompany us outside our homes as well. The vast majority of us already spend each day with a wireless computer in our pockets—a mobile phone. Researchers and phone companies alike are developing mobile phones as platforms for monitoring local environmental conditions and providing information about our personal ecological footprints based on activities our phones can sense.

## FORECASTS:

- New tools will emerge to help people manage their household energy accounts much the way they manage their financial accounts—using information from embedded sensors to come up with monthly balance sheets that translate household activity into energy costs and carbon footprints.
- Mobile tools will increasingly track the movement of users through the built environment to give them daily profiles of their sustainability—and perhaps even suggest more sustainable alternatives.

# PERSONAL SUSTAINABLE ECOLOGIES

Source: <http://www.agilewaves.com/products.html>



AgileWaves' Resources Monitor measures the ecological footprint of a home in real time—continuously monitoring electric, gas, and water use and reporting consumption and carbon footprint through a built-in touchscreen interface or a password-protected Web page.

Intel's Urban Atmosphere's research platform has developed Ergo, "a simple SMS system that allows anyone with a mobile phone to quickly and easily explore, query, and learn about their air quality on-the-go with their mobile phone."



Source: <http://www.urban-atmospheres.net/Experiments/Ergo/index.html>

## OTHER RESOURCES:

### Hypermiling:

<http://www.hypermiling.com/>

[http://www.motherjones.com/news/feature/2007/01/king\\_of\\_the\\_hypermilers.html](http://www.motherjones.com/news/feature/2007/01/king_of_the_hypermilers.html)

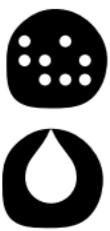
### Energy savings in smart homes:

<http://www.coe.berkeley.edu/labnotes/o803/wright.html>

<http://dr.berkeley.edu/>

**Peter Hesseldahl** "The combination of slightly intelligent appliances and flexible electricity pricing is called "demand response." One version of this would be that a consumer signs a contract with the utility that guarantees a particular level of performance. The consumer could get lower prices if the utility is allowed to manage the consumer's appliances in case of peak loads. For instance, the utility could dim the lights in a supermarket slightly, or turn off the freezers for a while—in many cases without anybody noticing."

# MASSIVELY RICH ECO-INFORMATION ENVIRONMENTS



Networks of tiny wireless sensors are opening up a new vista onto our world, enabling us to observe physical phenomena in real time at unprecedented resolution. These sensors keep a constant vigil on the natural and built environment, providing data that may well prove invaluable in the quest for sustainability.

## WHAT TO WATCH:

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- Urban pulse maps
- Terrestrial ecology observing systems (TEOS)
- Agriculture & cattle monitoring
- Continental-scale ecological networks
- Water modeling
- Worldwide sensor web

Sensor networks are the foundation of an information infrastructure that will be able to monitor the world from the smallest to the largest scales. They may be self-organizing networks of tiny sensors, just a few millimeters in size. Or they may be diverse platforms of sensors that use common communication and data protocols, as well as an open data policy to support continental-scale research.

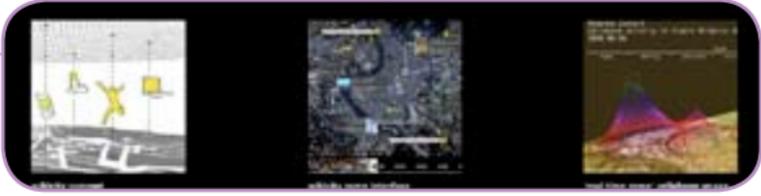
Already several universities and government agencies are working to put such an infrastructure in place. For example, NSF has funded the National Ecological Observatory—NEON— an observatory with over 20 participating institutions around the United States, linking distributed sensor networks to track continental-scale climate change, the effects of urban and exurban development, forest management, agriculture and biofuels, invasive species and infectious diseases, climate change effects through the water cycle, nitrogen deposition, and ecohydrology—all critical components of a truly science-based eco-management strategy. Meanwhile, projects like MIT's SENSEable City Laboratory, are using sensor networks at the city level to collate environmental information that can influence people's choices in real time.

## FORECASTS:

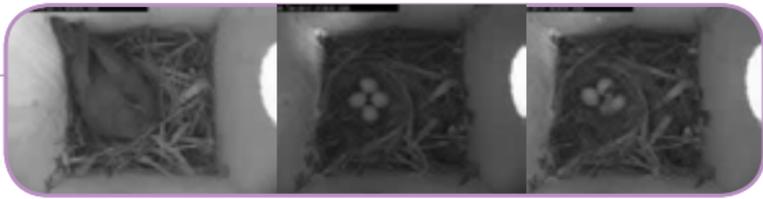
- Advances in silicon scaling and nano-scale MEMS will lead to increasingly smaller sensors.
- Sensor networks will become transformational instruments for scientists—equivalent in their impact to the development of the telescope or microscope.
- The need for new ways to filter the massively rich flow of information from sensor networks will drive new kinds of simulation and visualization of environmental processes that will literally change the way we see the world—much the way that CT-scans and MRIs have changed the way we see our bodies.

# MASSIVELY RICH ECO-INFORMATION ENVIRONMENTS

Source: <http://senseable.mit.edu/wikicity/rome/>



WikiCity Rome is an MIT project that uses data feeds from the city's telecommunications companies, transportation agencies, vehicle fleet companies, business, and local city agencies as well as individuals to map the "pulse" of the city in real time.



UCLA's Terrestrial Ecology Observing Systems deploy networked sensing systems to track very small events that can add up to big patterns—for example, tracking hatching of a bird's eggs to establish relationships between animal breeding and environmental conditions.

Source: <http://research.cens.ucla.edu/projects/2007/Terrestrial/AnimalCam/>

## OTHER RESOURCES:

### More on Terrestrial Ecology Observing Systems:

<http://research.cens.ucla.edu/projects/2007/Terrestrial/PlantCam/>  
<http://research.cens.ucla.edu/projects/2007/Terrestrial/Systems/>

### Water modeling:

<http://www.coe.berkeley.edu/labnotes/0803/wright.html>  
<http://dr.berkeley.edu/>

**Michael Dennis** "Unless one can solve the data management problems, it is unlikely that one can have global pervasive computing ... the development of standards is going to involve a great deal of negotiation among an array of players from governments, international organizations, private industry, and academia. Getting all these groups to compromise is going to prove a huge task, and it remains unclear who or what is up to the challenge."

# BOTTOM-UP ECO-REGULATION



Mobile devices, peer-to-peer networks, and new sensing technologies are poised to link people to their environments in new ways—providing unprecedented information about the quality of air, water, health factors, and sustainable products and services in their communities. These tools could catalyze de facto bottom-up eco-regulation by shaping both public opinion and individual behavior.

## WHAT TO WATCH:

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- Citizen sensor networks
- Community footprints
- Product and service footprints
- A new “sensing divide”

Most of the mobile devices that people carry today are sensors. Cell phones have cameras and location sensing. Health and fitness monitors measure vital statistics and even upload data to Web sites for shared data compilation. Over the next decade, it's likely that these devices will also begin to collect information automatically or intentionally about the environments that their users traverse. Simply by carrying or wearing these devices, people may join what will, in effect, become citizen sensor networks.

The question is: will this kind of pervasive, bottom-up eco-monitoring become a new frontier of civic life in which people take advantage of mobile sensing devices and peer-to-peer tools to influence community policy and even the behavior of others? High-resolution data about the environment and pollution will present strategic questions about how to manage eco-data transparency. The next decade will see local governments, citizen groups, employers, employees, and other stakeholders in a struggle to find meaningful and appropriate degrees of freedom and control—even as they mobilize to respond to environmental crises.

## FORECASTS:

- Concerns about personal health and the ability to directly track pollution levels in micro-environments will link personal self-interest to community environmental performance—driving a more active participation in eco-monitoring networks.
- Communities may use alternative reality games as a platform for simulating and exploring responses to environmental threats, from epidemics to the effects of climate change.
- People living in poor environmental conditions may become pathologized as a new underclass lacking the discipline or morals to make “green” or “eco-friendly” choices.

# BOTTOM-UP ECO-REGULATION

## Nokia Eco Sensor Concept



Nokia describes their Eco Sensor as “a mobile phone and compatible sensing device that will help you stay connected to your friends and loved ones, as well as to your health and local environment. You can also share the environmental data your sensing device collects and view other users’ shared data, thereby increasing your global environmental awareness.”

Source: <http://www.nokia.com/A4707477#stayintouch>

## SensorPlanet

Nokia is simultaneously developing a platform for integrating mobile sensor data on a global scale to support environmental researchers.

Source: <http://www.sensorplanet.org/index.html>

### OTHER RESOURCES:

#### Community footprints:

[http://www.bbc.co.uk/wales/mid/sites/knighton/pages/carbon\\_footprint.shtml](http://www.bbc.co.uk/wales/mid/sites/knighton/pages/carbon_footprint.shtml)

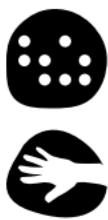
#### Online gaming for modeling epidemics:

Balicer, Ran D. (2007). “Modeling Infectious Diseases Dissemination Through Online Role-Playing Games.” *Epidemiology*, 18(2), 260-261.

Lofgren, Eric T. & Fefferman, Nina H. (2007). “The Untapped Potential of Virtual Game Worlds to Shed Light on Real World Epidemics.” *The Lancet Infectious Diseases*, 7(9), 625-629.

**Peter Hesseldahl** “With a high degree of environmental concern and an immediate risk of shortages of ecological breakdowns, ICT [information and communication technology] could be used for rationing, managing, and controlling the behaviours and consumption of individuals at a very detailed level.”

# SUSTAINABLE DESIGN



Pervasive computing and communication promise a lightweight world in which more of our economic value, as well as our pleasure, comes from embedded intelligence and cultural production than from converting natural resources into consumer goods. However, pervasive computing comes with a considerable ecological backpack—and sustainable design must take that into account.

## WHAT TO WATCH:

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- Dematerialized goods
- Multi-functional devices
- Virtual leisure
- Appropriate networks

A world of pervasive computing and communication is potentially a “dematerialized” world where people consume fewer material goods—or at least less material packaging. Spending money to download music appears to be more environmentally friendly than buying a packaged CD at the local box store. Spending one’s spare time jogging in shoes that monitor speed, distance, and vitals—and uploading the results to compete with people around the country—appears to use less energy and create less pollution than driving to a stadium to watch a favorite team play under lights.

However, while today’s electronic devices are much lighter and more efficient than ever before, there’s a hidden paradox in their efficiency. As they become smaller and more complex, they require more raw materials, energy, and water to manufacture. And by comparison to conventional goods, they require much more energy to produce: manufacturing an aluminum can requires 4 to 5 times its weight in fossil fuels; manufacturing a computer chip requires 600 times its weight in fossil fuels. Finally, if you factor in the tons of earth moved to mine the gold, palladium, chromium, and other raw materials that go into products like microchips and celphones, their environmental impact is even worse.

## FORECASTS:

- Designers, ecological advocates, and green consumers will demand high-tech products that have smaller ecological backpacks.
- The environmental costs of information technology will increasingly be accounted for in products and services even as they become smaller and more embedded—and companies that produce or use these products and services will increasingly be held accountable for those costs.

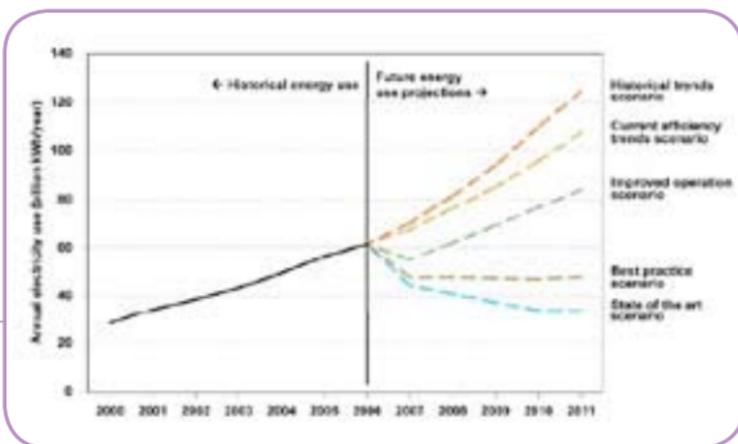
# SUSTAINABLE DESIGN

## THE MATERIAL LOAD OF RETAILING: BUYING MUSIC

<b>Buying a CD at a store</b>	<b>1.6 kg</b>
<b>Buying a CD online to be shipped</b>	<b>1.3kg</b>
<b>Downloading the music directly to a player</b>	<b>0.7kg</b>
<b>Downloading and burning to a CD</b>	<b>5.5 kg</b>

A study from The Wuppertal Institute shows that downloading music rather than buying it in packaged form substantially reduces the environmental impact of retailing—but accounts only for the energy to power a PC, MP3 player and the servers that support the network function. The environmental cost of the devices themselves is, of course, much greater.

A 2007 EPA study of data centers and servers in the United States identified a set of five alternative scenarios for reducing the environmental impact of networked communications—which currently account for 1-2 % of current energy consumption in the country.



Source: [http://www.energystar.gov/index.cfm?c=prod\\_development.server\\_efficiency](http://www.energystar.gov/index.cfm?c=prod_development.server_efficiency)

## OTHER RESOURCES:

### Virtual leisure:

<http://dsc.discovery.com/news/2008/02/05/parks-computers.htm>  
<http://www.ccsr.cse.dmu.ac.uk/staff/Ben/DisembodiedSport.html>

### Energy use of computing networks:

[http://www.energystar.gov/index.cfm?c=prod\\_development.server\\_efficiency](http://www.energystar.gov/index.cfm?c=prod_development.server_efficiency)

### Dematerialization:

“Dematerialization: Measures and Trends”, Journal of the American Academy of Arts and Sciences, Cambridge, MA, 1996

**Eric Williams** “Why should making microchips be so energy and materials intensive? The answer is entropy, or rather the lack of it. With feature size on chips at less than .16 micrometers, the microchip is the most ‘organized product ever made on a mass scale’. Every input must be exceedingly pure, and the environment in fabrication facilities must be carefully controlled to maintain that purity. Achieving this requires energy and chemical processing far exceeding the actual mass of the final products.”

# E-WASTE



While pervasive computing may be creating opportunities to improve sustainability, it may also be contributing to serious chronic illness and environmental pollution. As pervasive computing components are manufactured and recycled across the world in global production networks, a key issue will be how equitably manufacturers and local economies deal with toxic byproducts.

## WHAT TO WATCH

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- Digital dumps
- E-waste activism
- Tighter manufacturing and disposal restrictions
- Self-tracking technologies

High-tech electronics contain many materials—plastics, metals, and chemical compounds—that become hazardous to humans and the environment when they're released during manufacture, use, or disposal of electronic goods. Growing scientific evidence of toxic impacts has prompted both legislative restrictions and design innovations.

In some places, recycling of e-waste has become an informal backyard industry, providing jobs and much needed income, yet exposing local residents to hazardous gases resulting from primitive processing. Copper is sometimes recovered from wires by open burning to remove the casing, which contains dangerous levels of dioxins, furans, and other toxins. Circuit boards are treated to extract copper and precious metals, using acid, cyanide, and/or mercury, sometimes next to rivers.

A study published by *IEEE Technology and Society* found that “end-of-life” treatment of pervasive computing will have to deal with large numbers of small electronic components that are embedded in other products,” while “more and more microelectronic throwaway products ... will be found in waste streams outside that of electronic waste.”

## FORECASTS:

- Pervasive computing will increasingly be used to track its own footprint—and its own lifecycle path and destination—spurring an integrated cradle-to-grave approach.
- Re-mining of precious metals from computers will grow as companies specialize in these recovery operations, supported by legislation restricting the disposal of electronic goods.

# E-WASTE



A growing number of companies are targeting electronic products in their takeback and recycling programs in order to re-mine precious metals from them.

Seattle-based NGO, Basel Action Network, documented the dumping of computers from around the world in Lagos, Nigeria, where they most often end up in uncontained urban landfills to be burned.



Source: <http://www.youtube.com/watch?v=a0xpRk7MYNg>

## OTHER RESOURCES:

### Re-mining metals from electronics:

<http://pubs.usgs.gov/fs/fs06O-01/fs06O-01.pdf>

**Elizabeth Grossman** “The mining industry has discovered that obsolete computers—particularly circuit boards where precious metals are used—are a profitable source of recoverable metals. In fact, mining companies were among the first to promote electronics recycling and invest in the business.”

# RECYCLING & REUSE



If small mobile devices and wearables are going to be pressed into service as tools for bottom-up, distributed eco-monitoring, it becomes especially important that they find their way into recycling programs and not the local dump. Programs aimed specifically at recovering, reusing, and recycling today's mobile computing devices will be necessary parts of the solution.

## WHAT TO WATCH

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- Design for disassembly
- Takeback programs
- Re-mining of metals

Today's waste management maxim is reduce, reuse, recycle—where the first priority is to reduce the waste stream, the second is to reuse, and the third is to recycle. Already more computer and consumer electronics companies are developing recycling programs, in part in response to governments that are legislating responsibility for e-waste. Several European nations already require computer companies to have recycling programs and a number of American states are considering similar measures.

However, in the case of electronic technology, reduction and reuse are even more important than recycling. In a recent study, quantitative analysis of lifecycle energy use revealed that reducing and reusing were 20 times as efficient at reducing energy as recycling:

- Reselling 10% of end-of-life computers reduces life cycle energy use by 8.6%.
- Upgrading the same computers for reuse reduces energy use by 5.2%
- Recycling those same computers saves only about .43% of life-cycle energy.

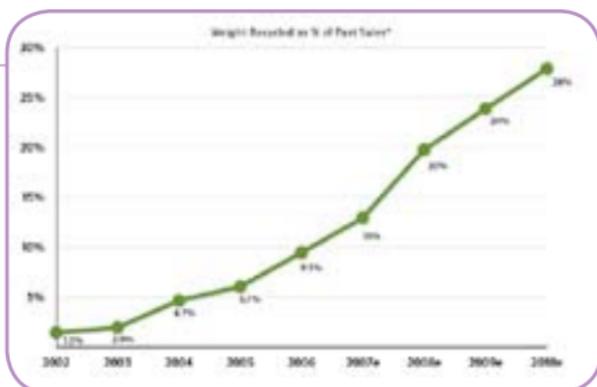
What causes this dramatic difference? The big energy investment in the life cycle of a computer is in producing its complex form rather than its physical substance.

## FORECASTS:

- In the U.S. and Europe, government-run recycling programs funded by “environmental handling charges” added to retail sales will grow.
- The opportunity to gather information about performance of their products and user behavior will serve as additional incentives for companies to develop “producer responsibility” takeback programs.
- Re-mining of precious metals from computers will grow as companies specialize in these recovery operations, supported by legislation restricting the disposal of electronic goods.

# RECYCLING & REUSE

Source: <http://www.apple.com/environment/recycling/>



Apple Computer, Inc. is one of the leading recyclers of computers and consumer electronics. Over five years they improved their recycling productivity by a factor of 6, and with takeback programs that include mobile devices manufactured by others, they expect that they will be recycling more than one-fourth of the weight of the products they sell by 2010.

A number of non-profit and for profit groups worldwide have developed takeback programs for electronic devices—for both reuse and recycling.

[ELECTRONICS TAKE-BACK COALITION]

## OTHER RESOURCES:

### Legislation and regulation:

<http://www.dtsc.ca.gov/HazardousWaste/EWaste/>

<http://www.epeat.net/>

[http://ec.europa.eu/environment/waste/weee/legis\\_en.htm](http://ec.europa.eu/environment/waste/weee/legis_en.htm)

<http://www.cleanproduction.org/Green.Greenscreen.php>

<http://www.necel.net>

<http://www.epa.gov/oppt/pbde/>

<http://www.rohs-international.com/china-rohs-documents>

**Hillary Nixon** “A random sample mail survey of California households ... found that the most popular alternative was a drop-off recycling program at regional collection centers funded by an environmental handling charge on retail sales of new consumer electronics. The least preferred option was a “pay as you throw” program that required consumers to directly return used products to the manufacturer for a fee.”

# HUMAN-FUTURE INTERACTION



If today's neuroscience is pointing to weaknesses in the way we think about the future, a host of tools are also emerging to augment our ability to interact with the future. Using sensors and visualization to bridge our neuro-cellular responses with our social and natural environments, these tools may drive an emerging discipline of human-future interaction.

## WHAT TO WATCH

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- Future prototyping
- Risk maps
- Visualization tools
- Brainwave sensors

Just as human-computer interaction has become a framework that links the capabilities of technology, the behaviors of users, and the goals of designers and developers, a similar approach to human-future interaction will increasingly connect the capabilities of design tools and media formats with the strategic needs of users, shaped by forecasters.

Two fundamental processes are likely to shape the practice of human-future interaction: user testing and rapid-prototyping. Already we see a number of tools that provide the building blocks of these practices. Biosensors measure our brain's responses to signals from the environment, create "pulse" maps of our collective states, and even provide neuro-feedback to change the way we see the world. At the same time, public media have the potential to become futures media, providing an opportunity to rapidly prototype and iterate alternative futures in ways that speak to the senses and can thus be measured by the new biosensing tools.

## FORECASTS:

- Future prototyping will become an increasingly public activity, with new platforms and tools for envisioning, communicating, and interacting with concepts about the future.
- Future media will combine with geomapping innovations to create in-place experiences of possible futures.
- Brainwave sensors will be used to measure human responses not only to products, entertainment media, and other marketing-driven applications, but also to futures media and simulations—possibly with decision-oriented feedback.

# HUMAN-FUTURE INTERACTION



Brainwave sensors and controllers like Neurosky's Think-Gear EM™ are designed as computer interfaces—to control gameplay, for example. But they could also be used to map brain responses to future scenarios and develop futures thinking exercises.

Source: <http://www.neurosky.biz/>

IFTF is prototyping a Google Earth mashup to link local community issues to future forecasts.



Source: <http://www.futurehere.org>

## OTHER RESOURCES:

### Human-future interaction:

[http://future.iftf.org/2007/02/the\\_case\\_for\\_hu.html](http://future.iftf.org/2007/02/the_case_for_hu.html)

**Peter Dreyer** “The “human-future(s) interaction” discipline is extremely interesting when trying to go beyond lead-user, lead-tribe dialogues to reach for the mass audience.”

# COLLECTIVE CORRECTIONS



If individual neuro-psychological factors distort our views of the future—as well as the decisions we make about it—a host of tools and frameworks suggest that collective processes can correct some of these distortions. All of these processes tend to shift the work of forecasting and strategic thinking out of the realm of professional forecasters to increasingly public platforms.

## WHAT TO WATCH

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- Crowdsourcing
- Open-source scenarios
- Predictive markets
- Collaborative forecasting games

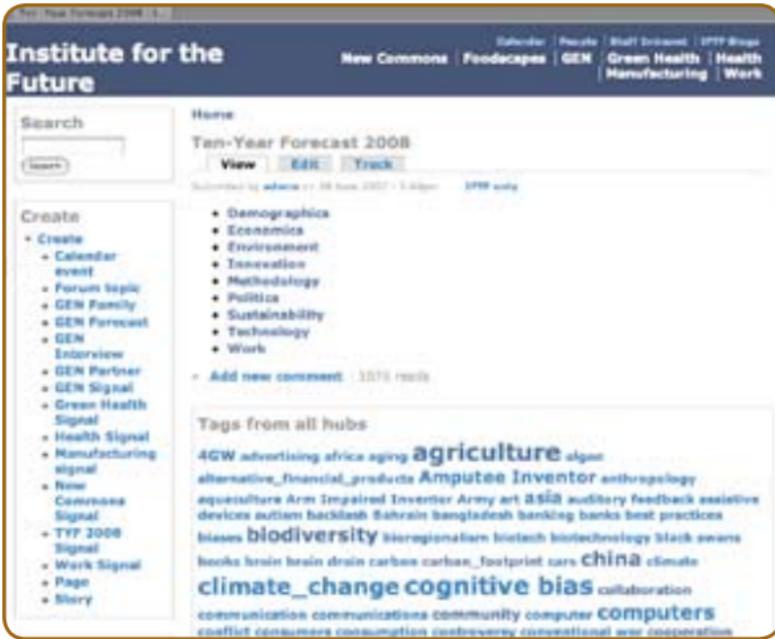
Over the past several years, online experiences in everything from collaborative problem-solving to prediction markets have demonstrated that distributed groups of people, with sufficient incentives, can come up with better solutions to complex problems—and more accurate forecasts of the future—than dedicated professional teams or traditional management processes for decision-making. Increasingly, these techniques are being adapted to forecasting and strategic planning within organizations.

At the same time, some organizational psychologists are trying to explicitly address long-term, individual decision-making biases by studying a category of behaviors they call organizational citizenship behaviors (OCBs). OCBs require individual employees to accept a short-term sacrifice in exchange for a long-term payoff for the organization. Jeff Joireman and his colleagues at Washington University found that employees who have high empathy ratings and who tend to adopt a long-term outlook with their organization are more likely to engage in OCBs than their workmates.

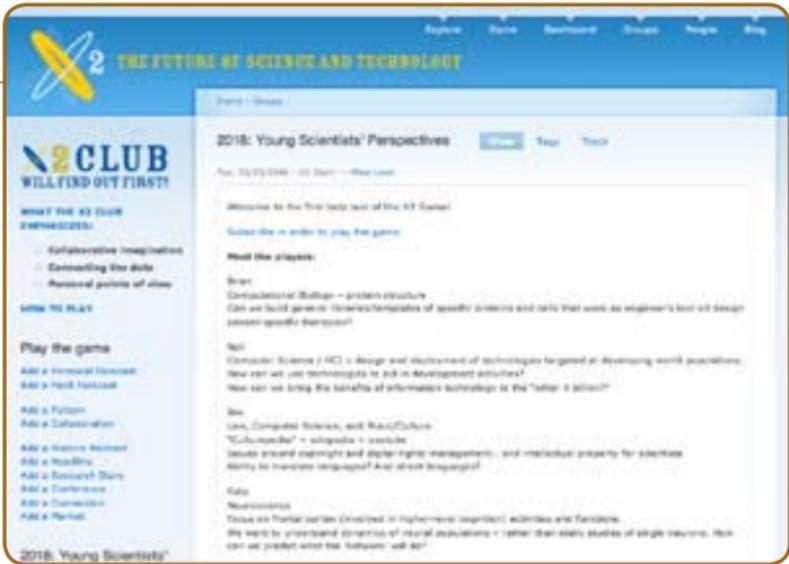
## FORECASTS:

- Collective tools for thinking about the future will diverge into two categories—those that harness the expertise of professionals by creating platforms for shared “signaling” of the future and those that harvest the wisdom of crowds through inclusive forecasting platforms.
- Collective platforms will be designed to address particular kinds of futures thinking biases—for example, supporting youth forecasting to tap the broader opportunity horizon of young people or linking forecasts and scenarios to specific biographical experiences of participants.

# COLLECTIVE CORRECTIONS



The *Ten-Year Forecast* program used an experimental platform this year for collecting future signals from a group of about 45 experts plus internal staff.



IFTF has launched a public project to engage both young scientists from around the world and the larger public in anticipating future developments in science and technology.

**Eliezer Yudkowsky** “While ... studies have found circumstances where a group estimate is more reliable than any individual estimate (the “wisdom of crowds”), this typically requires individuals to arrive at their judgments separately before averaging them together.”

# LOCAL CONTEXTUAL INTERVENTIONS



Individual factors shape the sense we make of the future. Some of these factors, like personality and age, are deeply rooted. Others are variable, like our sense of optimism. In addition, the uncertainty of our immediate environment colors our view of the future. Intervening in these “local contexts” of future events is one way to sharpen our vision.

## WHAT TO WATCH

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- Future time perspective (FTP)
- Optimism shifts
- Near-term choices
- Mind preparation

Age influences our view of the future. Future time perspective (FTP) is an established psychological construct representing the “scope of time ahead that influences present behavior,” and it is often measured by the sense of limitation and opportunity. The sense of opportunity is highest among young people, dropping by early middle age, and then stabilizing in late middle age. Limitation scores are higher for young adults and those in early middle age but then decline by late middle age. Diversity of age thus emerges as a key factor in everything from expert panels to strategic visioning exercises.

Moods and attitudes are more variable influences. For example, a shift from optimism allows people to anticipate potential bad news. Indeed, anticipating an undesired event can actually trigger behaviors that ensure that event is less likely to occur. But even when people are prepared, an optimistic stance toward the future can get in the way of making the right decisions. If people believe that they will have an opportunity to make the choice again, they often take the immediately satisfying option.

## FORECASTS:

- Futures researchers will develop processes for indexing the ages (and perhaps other personal factors) of people participating in forecasting and strategic exercises—and use those indexes to refine the forecasts or plans.
- Group forecasting processes will specifically evaluate optimism scales and use techniques to shift optimism scores in order to elicit diverse scenarios and strategies.
- Statistical techniques will be tempered by “deep dives” into the fourth and fifth standard deviations as a means of reframing the local context to anticipate “black swan” scenarios.

# LOCAL CONTEXTUAL INTERVENTIONS

## THE BLACK SWAN



The Impact of the  
HIGHLY IMPROBABLE

Nassim Nicholas Taleb

In *The Black Swan*, Nassim Nicholas Taleb argues that most of our statistical models—as well as our every-day experience—are based on physical events with definite limiting factors. But in today's information economies, we're entering a period in which these limits are being eased, or erased, changing the local context of the future:

*"In the random variables we observe today, like prices – what I call Type-2 randomness, anything that's informational – the sky is the limit. It's "wild" uncertainty. As the Germans saw during the hyperinflation episode, a currency can go from one to a billion, instantly. You can name a number, nothing physical can stop it from getting there. What is worrisome is that nothing in the past statistics could have helped you guess the possibility of such hyperinflation effect. People can become very powerful overnight on a very small idea.*

*"Take the Google phenomenon or the Microsoft effect—"all-or-nothing" dynamics. The equivalent of Google, where someone just takes over everything, would have been impossible to witness in the Pleistocene. These are more and more prevalent in a world where the bulk of the random variables are socio-informational with low physical limitations. That type of randomness is close to impossible to model since a single observation of large impact, what I called a Black Swan, can destroy the entire inference."*

## OTHER RESOURCES:

### **Future time perspective:**

<http://content.apa.org/journals/pag/22/1/186>

### **Mind preparation:**

[www.psychologicalscience.org/media/releases/2006/pr060329.cfm](http://www.psychologicalscience.org/media/releases/2006/pr060329.cfm)

**Christina Atance** "People find it difficult to predict how they'll feel under the influence of drives and emotions ... because such states are extremely difficult to conjure. For example, it's next to impossible to imagine the state of 'hunger' after eating an 8-course meal. It turns out that human memory seems to be well suited to storing visual images, words, and semantic meaning, but ill suited to storing information about visceral sensations."

# BIAS MANAGEMENT



Our perspectives on the future can be strongly shaped by cognitive biases. Some biases hinder our ability to think rationally about the future, skewing how we evaluate evidence, process new information, or weigh different alternatives. Others lead to different outcomes depending on how they're presented.

## WHAT TO WATCH

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- Scope insensitivity
- Motivated skepticism
- Memory bias
- Belief bias
- Availability heuristic
- Conjunction fallacy
- Hindsight bias

Futures work and forecasting techniques have developed without much formal attention to cognitive biases. To some degree, the rules of thumb that futurists use when engaged in scanning and scenario work have sought to counter obvious shortcomings in perception. But forecasters are still subject to biases that color their forecasts.

For example, a common problem with forecasting is the tendency to describe preferred futures. This bias corresponds to research results in which experimental subjects, when presented with an apparently balanced set of arguments for and against gun control and affirmative action, evaluate arguments they agree with more favorably, and spend more time attacking opposing views. Well-informed subjects are more, not less, likely to do so.

While most work on cognitive biases has focused on their impact on personal decision-making, these biases are now sufficiently well understood to allow futures researchers to develop techniques in expert aggregation, ethnographic analysis, and facilitated events to control for them.

## FORECASTS:

- Some cognitive biases, such as scope insensitivity or availability heuristic, may be resolved by changes in the social infrastructure that make the problems more tractable—for example, by applying microcredit to problems of poverty or providing filtered access to a broader set of data about the future.
- Neuro-simulations may soon be able to simulate alternative visceral states to improve our capacity to imagine and/or interpret future scenarios.

# BIAS MANAGEMENT

## A TAXONOMY OF COGNITIVE BIASES THAT COULD SHAPE FUTURES THINKING

Type of Bias	Description
<b>Scope insensitivity</b>	Our responses to problems don't scale as quickly as the problem itself. Helping a family is easier to comprehend than helping a region.
<b>Motivated skepticism</b>	We tend to evaluate more favorably new evidence for positions we already hold and are more critical of new evidence supporting positions we dislike.
<b>Projection bias</b>	When predictors in one visceral state make predictions about experience in another state, they project their own state into their predictions.
<b>Memory bias</b>	Our memories of past events are strongly shaped by how we felt about the beginnings and ends of the events, and by retrospection.
<b>Belief bias</b>	People have incorrect, yet popular and widely held, beliefs about decision-making and choice.
<b>Availability heuristic</b>	People judge the probability of an event by the ease with which examples come to mind.
<b>Conjunction fallacy</b>	Scenarios that are more detailed and specific sound more plausible and are taken more seriously than scenarios that are more general; in fact, they are necessarily less probable.
<b>Hindsight bias</b>	In evaluating forecasts after the fact, people tend to overestimate the ease with which events could have been predicted.

### OTHER RESOURCES:

#### **Slovic, P., Fischhoff, B. and Lichtenstein, S.**

“Facts versus Fears: Understanding Perceived Risk.” In Kahneman, D., Slovic, P., and Tversky, A., eds.

*Judgment under uncertainty: Heuristics and biases.*

New York: Cambridge University Press, 1982

**Eliezer Yudkowsky** “As scenarios become more detailed and specific, they often sound more plausible, and yet they necessarily become less probable. As Bruce Schneier pointed out—before hurricane Katrina—the U.S. government was guarding specific targets against “movie-plot scenarios” of terrorism, at the cost of taking resources away from emergency-response capabilities that could respond to any emergency.”

# MEMORY ENHANCEMENTS



Memory researchers have speculated that there are connections between our ability to remember the past and envision the future. People with severe amnesia not only lose the ability to recall past events, they are unable to imagine future events as well. Today's brain mapping appears to confirm these speculations—and points to memory enhancement as a strategy for better futures thinking.

## WHAT TO WATCH

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- Lifecaching tools and processes
- Neurofeedback learning
- Cognitive fitness regimes
- New Alzheimer's drugs
- Memory enhancement drugs

The development of fMRI has not only made it possible for scientists to map the locations of areas in the brain that are involved in episodic memory and future thinking; it has allowed scientists to watch which areas of the brain are activated when people recall past events and think about future events. These studies have shown that the left hippocampus, right inferior parietal lobe, and portions of the occipital gyrus are significantly activated for both past and future events—though others are used exclusively for past or future thinking.

Efforts to strengthen memory, either through drugs or Brain Age-like exercises, may have an effect on personal abilities to think about the future—with the important caveat that human memory isn't just a computer-like activity of recalling past events, but is an active process of reconstructing past events—and cannot be entirely divorced from psychological states and attitudes. (See “Neuro-Futures: Local Contextual Intervention.”)

## FORECASTS:

- Inexpensive, simple neurofeedback and memory-enhancing techniques will find their way into the workplace—helping users refine the ability to think about future activities.
- New forecasting methodologies may focus on the systematic processing of individual memory and corporate/institutional memory as a means of re-envisioning the future.

# MEMORY ENHANCEMENTS

## FOUR WAYS OF THINKING ABOUT THE FUTURE— AND THE PAST

The future as a continuation of a repeating past	In the most basic future-oriented process, people form expectations for what will happen next in a series of repeating events.
The future as projection of past trends	Future expectations are based on extrapolations of current trends rather than on simple repetition of the same events.
The future as construction from analogy	Expectations about the future are based on other experiences.
The future as imagination and invention	This process does not rely on memory of the past—we are able to imagine and create scenarios that have never occurred before.

Source: Haith, M. M. (1997). The development of future thinking as essential for the emergence of skill in planning. In S. L. Friedman & E. K. Scholnick (Eds.), *The developmental psychology of planning: Why, how, and when do we plan?* Mahwah, NJ: Erlbaum, 1997.

Exercises for cognitive fitness and memory enhancement, based on new brain sciences, could become tools for futures research and forecasting.

## MIND HACKS

*Tips & Tools for Using Your Brain*



Tom Stafford & Matt Webb

Foreword by Steven Johnson, author of *Mind Wide Open*



**Christina Atance** “The question of why our species sometimes seems doomed to repeat our own and others’ past mistakes—despite evidence that should prevent us from doing so—is of significant practical importance.”

# HAPPINESS STRATEGIES



Research in positive psychology reveals the surprising biases we have against making decisions that make us happy. Other research suggests that attitudes toward waiting—and the amount of pleasure or pain waiting is expected to generate—affects our willingness to delay outcomes, rewards, or punishment. Popularization of these insights could help individuals understand their own biases and hindrances to good futures thinking.

## WHAT TO WATCH

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- Positive psychology
- Mood alteration
- Option management

Mood, imagination, and the sense of choice can all bias our forecasting abilities. In one study, people persuaded to feel sad were worse at generating potential good events in their future, and the inverse was observed when researchers induced positive feelings. Aggregating expert opinion about the future or facilitating group strategy sessions should thus take into account the moods of people. But perhaps more importantly, inducing feelings of happiness could lead to better visions of the future—and to greater future happiness.

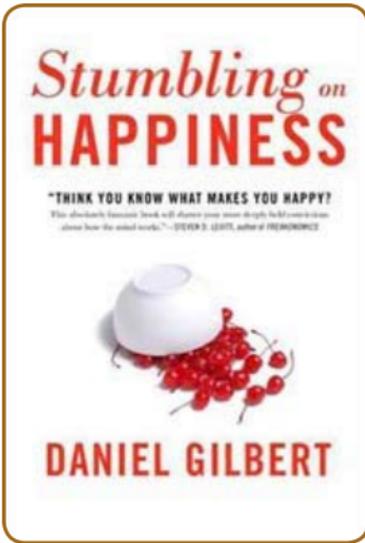
Surprisingly, having more future options doesn't necessarily lead to happiness. A study by Christopher K. Hsee and Reid Hastie shows that having more options can lead to worse experiences. For example, if employees are given a free trip to Paris, they are happy; if they are given a free trip to Hawaii, they are happy. But if they are given a choice between the two trips, they will be less happy, no matter which option they choose.”

## FORECASTS:

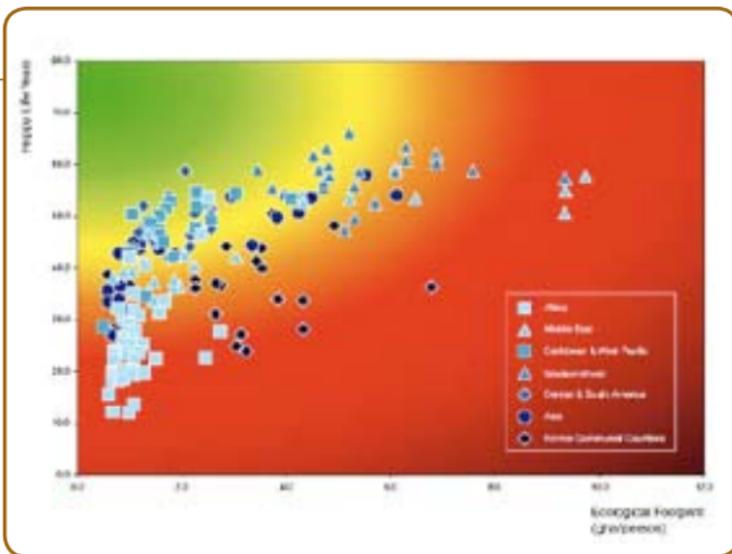
- New strategic planning processes will take into account not only the biases introduced by mood, but also happiness outcomes.
- Happiness will increasingly become a metric—along with measures of financial, social, and environmental benefits—in assessing future scenarios and strategies.

# HAPPINESS STRATEGIES

Source: <http://www.randomhouse.com/kvpa/gilbert/>



Daniel Gilbert explores the relationship between happiness and our ability to imagine the future—detailing the psychology of how our imaginations fail us.



The New Economics Foundation uses survey data to assess national happiness using this formula:

$$\frac{\text{Life satisfaction} \times \text{Life Expectancy}}{\text{Ecological Footprint}}$$

The resulting index links happiness to ecologically sustainable futures, and shows that no country is solidly in the sustainable zone.

Source: [http://www.neweconomics.org/gen/z\\_sys\\_publicationdetail.aspx?pid=225](http://www.neweconomics.org/gen/z_sys_publicationdetail.aspx?pid=225)

**Christopher Hsee and Reid Hastie** “To choose the experientially optimal option, decision-makers not only need to make accurate predictions of future experiences, but also need to act on their predictions. Yet they do not always do so. Instead of choosing what they predict will generate the greatest overall happiness, they variously choose the option that has the greatest immediate appeal (impulsivity), that fits their choice rules (rule-based choice), that is easy to justify (lay rationalism), or that yields the greatest token reward such as money (medium maximization).”

# BIOCOMMONS



The biosphere will be the primary ground of innovation in this century as humans leverage new ecological and biological information to address environmental issues and create new economic value from the bio-sciences. The biosphere thus becomes a prime target for enclosure—and a prime domain for experimenting with new commons.

## WHAT TO WATCH

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- Open-source pharma
- Ethnobotanical databases
- Genetic genealogy databases

Biocommons are emerging as a way to gather and share biological information, to protect biological information from overly restrictive patenting, and to enable innovation and collaboration in the biosciences.

For example, open-source pharma offers a parallel track to traditional industrial pharmacology, with a special focus on developing drugs for so-called orphan diseases that don't promise the large markets targeted by big pharmaceutical companies. At the same time, traditional users of ethnobotanical material—the native medicinals from around the world—are creating biological knowledge commons to record these practices in an open forum and protect them against enclosure.

Similarly, as bioengineers experiment with the basic building blocks of life to create—and patent—novel life forms, an open-innovation movement is evolving in parallel. The BioBricks Foundation, for example, has taken the lead in defining a set of open-source DNA parts to be used much like open-source software code. In addition, a number of initiatives are trying to define various benefits-sharing strategies that allocate some of the value of patenting life to go back to the communities that provide the source material or knowledge.

## FORECASTS:

- Open biological development will follow the same trajectory as open-source software, with open systems providing the foundational platforms, while private offerings add layers of value and benefit.
- Public policy debates over patenting of bioforms will grow—and biocommons will be both a source of the debates and a tool for resolving them.
- The rules governing sourcing of DNA and biological components will become increasingly complex as both open and proprietary sites for sharing biological information and material proliferate.

# BIOCOMMONS



Source: <http://bbf.openwetware.org/>

The BioBricks Foundation is a nonprofit organization founded by engineers and scientists from MIT, Harvard, and University of California, San Francisco to encourage the development and responsible use of technologies based on BioBrick™ standard DNA parts. The DNA sequence information and other characteristics of BioBrick™ standard biological parts are made available to the public free of charge currently via MIT's Registry of Standard Biological Parts.

Comprehensive, collaborative, ever growing, and personalized, the *Encyclopedia of Life* is an ecosystem of Web sites that makes all key information about all life on Earth accessible to anyone, anywhere in the world—as a way to protect specific life forms from enclosure.



Source: <http://www.eol.org/>

## OTHER RESOURCES:

### Open biology platforms:

BiOS: <http://www.bios.net/daisy/bios/home.html>

### Open DNA geneology:

<http://www.ybase.org/>

**Howard Rheingold** "Who owns life? Who has the right to claim private ownership over life-forms created from public knowledge? Over the next several decades, the capability of creating synthetic lifeforms will trigger conflicts over property regimes, commons governance, and enclosure issues in synthetic biology and the medicine based on it."

# IDENTITY COMMONS



In the online world, identity is increasingly becoming a resource to be managed. And as social networking applications link people together, identity is also becoming a shared resource. Over the next decade, identity commons will become a way to manage this resource—collectively and individually.

## WHAT TO WATCH

---

- Open ID protocols
- Social graphing
- Freesouls movement
- Persistent avatars

The open identity movement is evolving at the intersection of social networking applications and the massive growth of online collections of personal data—from commercial transactions to “taste trails.” Online users are eager to protect themselves against identity theft while assuring their anonymity in a variety of online activities. But they are also increasingly managing their identities in public social spaces such as Facebook, looking for easy ways to propagate their social networks throughout their applications while still maintaining control and privacy.

Open identity platforms are a commons-based solution to this problem, and several open identity standards have emerged. The most widely used today is OpenID, which has been adopted by a variety of services, including VOX, Technorati, and even AOL. A related open-identity movement is the social graphing movement, which seeks to map all Internet users and how they’re related. The goal is to make it easy for users to manage all their network links as they move from application to application—while still providing the controls of anonymity and alternate identities.

## FORECASTS:

- Users will increasingly manage their identities from a few services that track all their login information across the internet.
- The success of the open-identification movement will depend on widespread use of the standards—and especially adoption by commercial services.
- The social graphs that are created in individual social networking applications will increasingly be aggregated using open-source software for collecting, merging, and redistributing graphs into one global graph—creating a social graphing commons.

# IDENTITY COMMONS

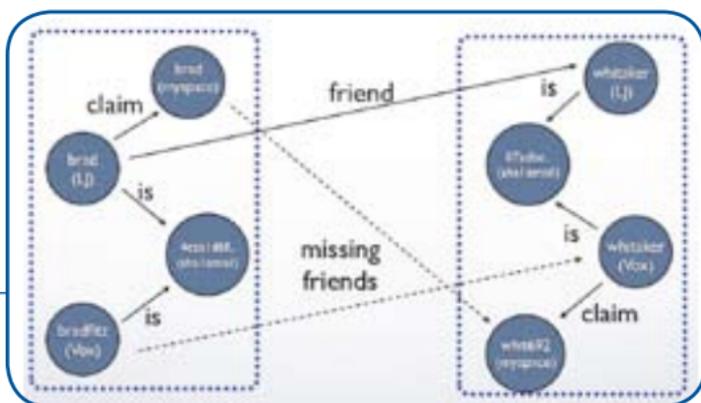


Source: <http://claimid.com/>

ClaimID is a service built on OpenID standards that allows individual users to create and manage their own source identity page, linking to other sites where they may be identified. It thus provides a way for users to say “I am this person, and this is what is true about me.”

Brad Fitz is an advocate of open global social graphing of the Internet as a way to overcome the problem of “hundreds of disperse social graphs, most of dubious quality, and many of them walled gardens.” Such a commons would for example, solve the problem of “missing friends” across applications.

Source: <http://bradfitz.com/social-graph-problem/>



## OTHER RESOURCES:

### Open standard identity commons:

- <http://openid.net>
- <http://www.xdi.org/>
- <http://www.idcommons.net/>

### Freesouls:

- [http://joi.ito.com/archives/2007/06/18/freesouls\\_and\\_photo\\_commons.html](http://joi.ito.com/archives/2007/06/18/freesouls_and_photo_commons.html)

**Sam Rose** “The beginning era of the Internet saw identity as a private commodity. Traditionally, users surrender their identity and personal data to service providers in exchange for access to networks and services. Identity Commons provides users with the access to open standards technology to control access to their identity, and eventually, their personal data. Widespread adoption of Open Standards Identity Commons will also pave the way for Open Standards trust metrics, and trusted data sharing.”

# MONEY COMMONS



Like other resources that leverage knowledge, social connections, and trust, money is emerging as a resource that can be managed effectively using the principles of new commons—and especially leveraging peer-to-peer structures. These money commons will not only provide competitive return-on-investment, but will also increase transparency, build financial literacy, and support local and values-based investment.

## WHAT TO WATCH

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- Social lending
- Micro-pledging
- Micro-lending
- Trust-based donations
- Solari investment circles

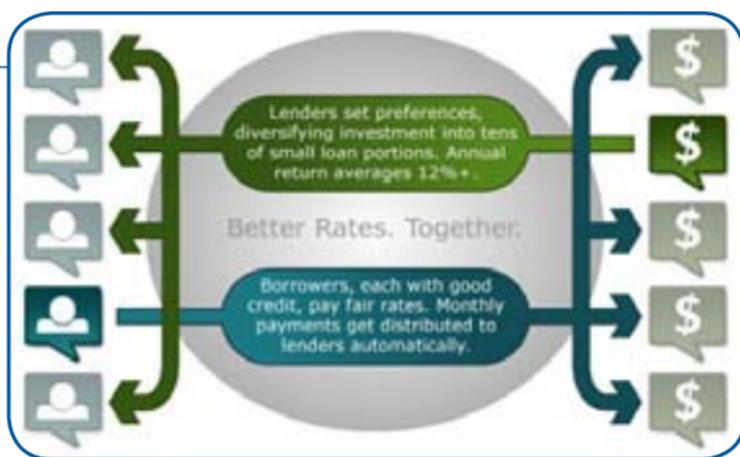
The peer-to-peer practices of the Internet have begun to inspire innovations in the way people manage their money. Networks of people are performing some of the basic financial services that banks typically do. This has come to be called social lending—an online site where people meet not for social or business purposes, but rather to lend and borrow money at rates that are advantageous to everyone. Social lending sites, like ZOPA, claim they can do better than banks because they don't have the huge overhead associated with branch offices and thousands of employees.

Peer-to-peer practices are also being used to change the way that money is pooled to bolster community health and global development. Examples range from peer-to-peer micro-lending sites like Kiva.org to the Solari Investment Circles that leverage personal networks and trust to invest locally—and achieve better returns not only on financial capital, but also on social, intellectual, and environmental capital.

## FORECASTS:

- Social lending has the potential to disrupt banking at the community level—particularly in the wake of risky loan practices—and trigger a host of regulatory debates.
- Social lending will provide an alternative to current large funds for socially responsible investing—perhaps undermining a key strategy for encouraging socially responsible business.
- Micro-pledging and micro-lending, combined with social lending, will create new forms of philanthropy in which a distributed community collectively sets investment priorities through thousands of small investments and individual decisions.

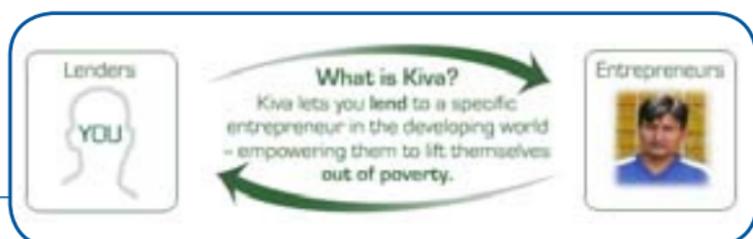
# MONEY COMMONS



Source: <http://www.lendingclub.com>

Lending Club is one of a handful of new social lending networks where members can borrow and lend money among themselves at better interest rates. These networks are examples of how entrepreneurs can profit by providing commons-based services.

Kiva combines two potent ideas—social lending and micro-lending—to plot a new strategy for economic development in the world's poor communities.



Source: [www.kiva.org](http://www.kiva.org)

## OTHER RESOURCES:

### Social lending networks:

- <http://www.prosper.com/>
- <http://uk.zopa.com/ZopaWeb/>
- <https://www.boober.nl/>
- <http://www.prosper.com>
- <http://www.smava.de/>

**Sam Rose** "Solari has spread to several communities across the United States. The concept is re-invigorating the idea that people can pool money directly and invest locally to help them sustain community growth. Solari also pushes people to become more literate about the systems around them, and creates conditions for more local financial and civic transparency. Solari also has the potential to [generate wealth] that stands apart from traditional multi-national corporate entities and is focused on sustainability of many different types of commons while building wealth, yet is still for-profit instead of non-profit."

# LEARNING COMMONS



As public and private education continues to struggle to meet the needs of learners in a rapidly changing world, learning commons offer an alternative way for people around the world to build skills, develop lifelong learning networks, and contribute to knowledge creation. Learning commons will bring more transparency, more collaboration, more innovation, and perhaps more fragmentation to the process we are thinking of as education.

## WHAT TO WATCH

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- Open-source curricula
- Learning technology commons
- Open academic journals
- Media mash-ups & multiplayer games
- Social bookmarking
- Open databases & wikis

Education sits at the top of a pyramid of knowledge activities that require collaboration and sharing—as well as shared management activities like sorting, filtering, and ranking. From the top to the bottom of this pyramid, a patchwork of private enterprises and public services has created a system that is failing to provide the world with educated citizens who can contribute productively and grapple with the pressing problems of today's society.

Open learning systems attempt to address this failed system by combining innovations in social media, peer-to-peer production, and distributed sorting, filtering, and ranking. At the level of knowledge creation, open journal systems increase the speed and effectiveness of peer review and make new knowledge available more widely. At the level of sorting, filtering, and ranking, open tools ranging from social bookmarking to open databases are distributing the work across knowledgeable communities and producing open-source curricula. Finally, at the level of crafting this knowledge into learning experiences, new media tools and user-created worlds are helping the next generation develop new literacies for a more complex world.

## FORECASTS:

- New learning commons will require—and also contribute to—a new transliteracy that leverages traditional knowledge skills like reading and writing as well as skills in new media, social networking, and cooperative practices like peer-to-peer production.
- Learning commons will propagate new ideas and new modes of learning faster and across a broader and more diverse population, creating new learning diasporas worldwide.
- New learning commons will go hand-in-hand with bottom-up development strategies to make the world's knowledge more easily accessible to people who have been disenfranchised by the lack of education.

# LEARNING COMMONS

## CREATE CONTENT

Creating content in Connexions is as easy as **1, 2, 3**:



**1** Get an account and log in to your workspace.



**2** Make a module from scratch or convert it from a Word doc.



**3** Publish your works, sharing them with the world.

Source: <http://cnx.org/>

Connexions is a peer-to-peer platform for sharing and using open-source learning modules that can be organized into courses, books, and reports—and tapped by both teachers and learners.

The Global Text Project is described as a complement to the One Laptop per Child project, focusing on courseware rather than hardware for the world's poorer populations. The project will create open-content electronic textbooks and specifically address distribution issues in access-poor regions.



Source: <http://www.globaltext.org/>

## OTHER RESOURCES:

### Open journal systems:

<http://pkp.sfu.ca/?q=ojs>

### Open science:

<http://sciencecommons.org>

### Open-source data bases:

<http://dabbledb.com/>

**Mary Ann Allison** “While the idea of universal education is not new, the idea of distributed technology for self-education has a new feel to it ... these local commons not only provide shared resources for internal consumption but also generate technologies which become part of the human technology commons. Although most of the technologies are physical, I am hopeful that entrepreneurial communities that deliver killer-app social processes will soon arise.”

# URBAN COMMONS



Layering information, media, and networks on the built environment creates new kinds of urban spaces—spaces that are neither virtual nor physical, but both. These new urban spaces are distinctly collaborative, distinctly local, but created and maintained by people who are geographically and institutionally distributed. They are today's urban commons.

## WHAT TO WATCH

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- Green maps
- Urban pulse maps
- Community currencies
- Local purchasing rewards
- Street art
- Virtual graffiti

Education sits at the top of a pyramid of knowledge activities that require collaboration and sharing—as well as shared management activities like sorting, filtering, and ranking. From the top to the bottom of this pyramid, a patchwork of private enterprises and public services have created a system that is failing to provide the world with educated citizens who can contribute productively and grapple with the pressing problems of today's society.

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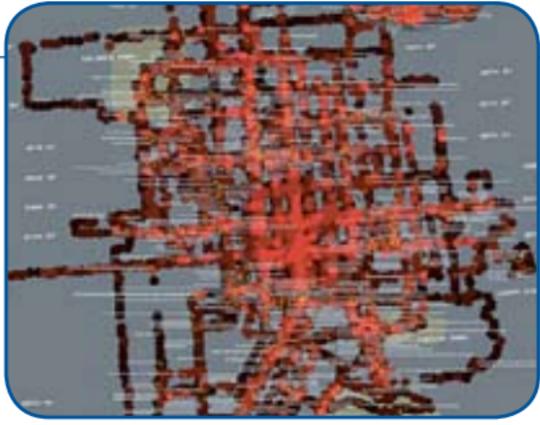
## FORECASTS

- Geomapping will foster a host of new urban commons as maps identify shared resources that were previously invisible. Of course, geomaps themselves may be a commons.
- Peer-to-peer collaboration in virtual spaces that support the physical spaces of the city will create a template for peer-to-peer collaboration and production in the actual physical spaces themselves—invigorating and increasing the value of unexpected urban niches.
- Urban commons are likely to nurture a new civic engagement, rooted in local experience, that will ripple through global geopolitical politics—further amplifying the voice of cities in relation to state and national governments.

# URBAN COMMONS

Source: <http://sf.biomapping.net>

The San Francisco Emotion Map project invited the public to go for a walk, using a device that measures physiological responses to the



surroundings to create the map shown here. The project is described as a “collective attempt at creating an emotional portrait of a neighborhood and envisions new tools that allow people to share and interpret their own bio data.”



Online sites like Melbourne Grafitti celebrate the street art of a city—converting a marginal urban activity into a shared value for the community as well as increasing its potential value for contributing street artists.

Source: <http://www.melbournegraffiti.com/>

## OTHER RESOURCES:

### Local purchasing networks:

<http://interraproject.org>

### Green mapping:

[www.greenmap.org](http://www.greenmap.org)

### Stigmergy and grafitti:

<http://tagging.us/html/pr.html>

**Mark Elliott** “The increasing capacity to document and track [street art] via the Internet increases the likelihood that such activity will influence broader cultural trends, artistic or otherwise. Perhaps as a consequence, in artistic circles, street artists are enjoying more recognition in artistic institutions such as art schools and galleries. As a distributed, ad-hoc, stigmergic, decentralized activity, street art provides an interesting and atypical model of commons generation.”

# HEALTH COMMONS



As private health care costs soar, more people are turning to online sites and support groups to solve their health problems—contributing their own experiences to a common pool of information that could eventually shape medical best practices. Health itself is even being reframed as a common resource that groups of people can invest in to create better outcomes for everyone in the future.

## WHAT TO WATCH

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- Bottom-up aggregation of treatment outcomes
- Childhood health as a commons
- Workplace health commons
- Donation-based health care

In the midst of the many debates about how best to provide health care to a diverse population, health commons are not only a way for people to self-organize to get better health information. They are also a way for people to create health information that the health industry itself may not be able to create—aggregating the experiences of millions of people from the bottom up to track specific health and disease patterns, to share their experiences with drugs and therapies, and even to innovate therapies.

Health commons may also leverage “smart mob” principles to create health and wellness mobs—diabetes mobs, backmobs for back injuries, welliemobs for moms who walk dogs together, weight-loss mobs, and more. These health mobs use web-based tools to help people find each other, suggest and start smart mobs to monitor health, set goals and reward achievement. They work by matching interests and using positive peer pressure to support one another in reaching goals; they use knowledge tools and media that help them visualize success.

## FORECASTS:

- The results of sites that aggregate experiences with traditional and alternative therapies may lead to a standard of integrative medicine that has been slow to emerge in the current medical system, especially in the United States.
- Health commons may take a lesson from emerging money commons (see “Money Commons” signal), and find ways to organize social network-based insurance for health. (See also “Islamic Influence: New Ways to Manage Risk.”)
- Recognizing the future costs to communities of childhood illnesses such as obesity and diabetes may lead to the formation of local childhood health networks that monitor and support local children’s health as a community resource.

# HEALTH COMMONS

## patientslikeme™

PatientsLikeMe is an online community where people can share information about treatment modalities, share their experiences with them, and participate in large-scale projects that effectively serve as “epidemiological studies” of diseases and interventions.

### Mood Map

Answer simple questions every week about your Function, Distress, External Stress, Life Activities, and Symptoms to create your Mood Map.

### Mood Map



Source: <http://www.patientslikeme.com/welcome/community/mood>

Activmobs is the result of an urban design project in Kent County, United Kingdom, that focused on creating the infrastructure for people to form self-organizing groups—called Activmobs—that support healthy activities in the local environment.

## Activmobs

Making preventative health fun and accessible

Source: <http://www.designcouncil.org.uk/en/Case-Studies/All-Case-Studies/Activmobs/>

## OTHER RESOURCES:

### Health data mashups:

<http://www.fluwikie.com/>

### Open-access health publishing:

<http://www.who.int/hinari/en/>

<http://www.medknow.com/>

**Greg Wolff** “Patient groups [are] aggregating outcome information to improve treatments more effectively than the current healthcare industry ... [leading to] better treatments faster, more power flowing to patients and patient groups, conflicts over ‘intellectual property’ with respect to medical information, conflicts over insurance coverage where the interest of sharing data to improve treatments conflicts with the necessity of hiding data to maintain coverage.”

# POLICY COMMONS



The worlds of governance and policy are ripe for innovation, using the principles of new commons and the affordances of new technologies for peer-to-peer production, social networking, and new media. Look for everything from new forms of voting to new forms of policy-making and even new kinds of citizenship.

## WHAT TO WATCH

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- Social solutions commons
- Technology-supported town meetings
- Electronic polling software
- Electronic decision making
- Open government databases

Civic spaces have always been, almost by definition, commons. They are the spaces—literal and metaphorical—where people gather to influence the policies of society. Inspired by peer-to-peer processes and knowledge commons, a host of innovations in virtual civic spaces are likely to change the way that policy is made in the coming decades.

The examples range from social solutions commons, which are organized like peer-to-peer technological innovation commons, to electronic polling and town meetings, to peer-to-peer sites that promote transparency. The latter are particularly potent as they tend to surface hidden issues and bring them before the public. For example, Witness is an online site that encourages people to photograph or video human rights injustices and share the results online. Maplight taps distributed knowledge about political contributions to link donations to specific legislation.

In keeping with the geographic agnosticism of many new commons, policy commons are increasingly global in their goals: iCommons specifically targets global sharing of knowledge for positive change; Declare! strives to build a network of “earth citizens.”

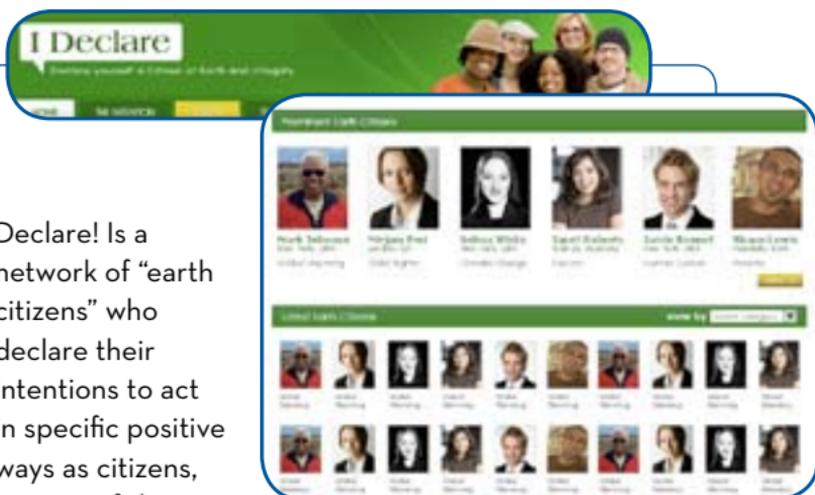
## FORECASTS:

- As policy commons implement social networking tools and strategies, the issues they frame and the solutions they propose will increasingly reflect the reach of various social networks—which may not coincide with today’s institutional jurisdictions.
- Political transparency will increase as peer-to-peer systems aggregate bottom-up monitoring of more and more aspects of political life—not just the scandalous but also the invisible details that make political systems work.
- New forms of citizenship will emerge as people engage in transborder commons, tap new ways of expressing political will, and align themselves with new communities of influence.

# POLICY COMMONS

Source: <http://www.neo.org/about>

Declare! Is a network of “earth citizens” who declare their intentions to act in specific positive ways as citizens, not just of their legal nations, but of the Earth. It represents a kind of bottom-up policy commons focused on global change.



MAPLight.org seeks to “illuminate the connection between money and politics.” They connect the dots between campaign contributions and U.S congressional votes, “providing groundbreaking transparency so that bloggers, journalists, and citizens can hold legislators accountable.”

Source: <http://www.maplight.org>



## OTHER RESOURCES:

### Transparency sites:

<http://www.theopenhouseproject.com/>

### Consensus polling and town meetings:

<http://www.aboutus.org/ConsensusPolling>

[http://www.americaspeaks.org/services/town\\_meetings/what\\_is.htm](http://www.americaspeaks.org/services/town_meetings/what_is.htm)

### Peer-to-peer politics:

<http://del.icio.us/mbauwens/P2P-Politics>

**James Jacobs** “Open and freely accessible government information is a pillar of our democracy. As James Madison said: ‘A popular Government without popular information or the means of acquiring it, is but a Prologue to a Farce or a Tragedy or perhaps both. Knowledge will forever govern ignorance, and a people who mean to be their own Governors, must arm themselves with the power knowledge gives.’ The Open House Project and the many groups involved in the conversation seek to make Madison’s quote a reality in the digital age.”

# INFRASTRUCTURE COMMONS



New and not-so-new social structures—from community property to peer-to-peer networks—are combining with alternative technologies to create alternatives to public-good infrastructures. Key issues here are universality of access, critical mass, maintenance incentives and mixed public-private-commons layers of infrastructure.

## WHAT TO WATCH

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- Wireless mesh networks
- Net metering + local power generation
- Open spectrum
- Open Internet
- Bicycle and car sharing

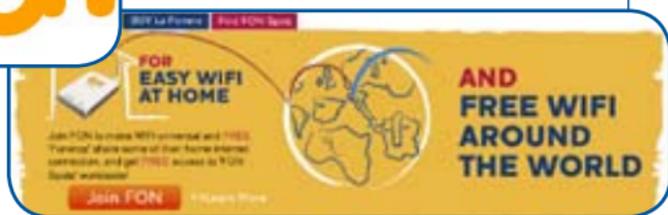
In the modern developed world, most infrastructure is maintained either as a public good by public institutions or as a private utility, with more or less regulation by public institutions. These regimes are appropriate when technology is expensive and depends on large-scale, centralized implementation. But with the emergence of lightweight technologies and tools for managing them in a distributed manner, commons-based approaches become feasible.

Tools for managing the infrastructure commons are particularly important, and here the innovations in peer-to-peer systems, social software, mesh networks, and new forms of metering all tend to push management functions to the edge of the system, allowing people to opt in, contribute small amounts, and reap large rewards. These tools, as much as the infrastructure technologies themselves, will continue to be the big drivers of new infrastructure commons. The biggest challenge? Partially enclosed systems will reduce trust in the commons, while opt-in solutions will leave a portion of the public without the minimum resources necessary to join the commons.

## FORECASTS:

- New tools for supporting infrastructure commons will be developed.
- Gaps in the infrastructure will be filled by a combination of public and private actors.
- Efforts to privatize or enclose the infrastructure commons will drive uncertainty in the market and exacerbate infrastructure gaps. They will slow (but not stop) development of commons solutions.
- Commons-based infrastructures will tend to evolve faster than infrastructures maintained as private utilities or public goods.

# INFRASTRUCTURE COMMONS



Source: <http://www.fon.com/en/>

FON is trying to build a wireless network from the individual contributions of users who agree to share their bandwidth. This infrastructure sits on top of the wired network (DSL, cable), and allows users who share their bandwidth at home to access any other FON hotspot for free. The hotspots are also accessible to users who are not within the system, for a price.

iBike.org is an international organization devoted to promoting bicycling as a sustainable transportation alternative. It identifies three primary models of bike sharing: multiple locations with no membership and no real tracking; controlled networks with several stations for short-term lending, with member check-outs; and single source stations with long-term lending and maintenance by member volunteers.



Source: <http://www.ibike.org/encouragement/freebike-details.htm>

## OTHER RESOURCES:

### Net metering and local power generation guidelines:

[www.eere.energy.gov/greenpower/markets/netmetering.shtml](http://www.eere.energy.gov/greenpower/markets/netmetering.shtml)

### Open spectrum:

[www.reed.com/Papers/openspec.html](http://www.reed.com/Papers/openspec.html)

[www.greaterdemocracy.org/OpenSpectrumFAQ.html](http://www.greaterdemocracy.org/OpenSpectrumFAQ.html)

**Marc Dangeard** “The beauty of the FON concept is that if it is successful, it will create a very robust wireless network that will be owned and managed by the users, and with built-in redundancies (if all my neighbors are FON users, I could get access to the network even if my own connection is down). The risk is that the whole infrastructure today is only a layer on top of the existing wired network, which is controlled by telcos. Such risk can be mitigated once there is critical mass.”