

HOW TO USE THIS MAP

The 2008 Sustainability Outlook Map is a guide to sustainability strategy for the coming decade. It's organized in four rows, representing four broad strategic responses to sustainability challenges. These four rows intersect with seven columns, representing diverse perspectives, or lenses, on sustainability—diverse arenas of innovation. Together the rows and columns form a grid for exploring future sustainability strategies.

Waving across the map are dozens of **signal banners**. They form a landscape of innovations that are likely to appear over the coming decade.

Dotting the map are **wild cards**. These are high-impact, hard-to-predict events that can significantly alter the sustainability strategy landscape, bringing potential disruption and unique risks.

Finally each row has one **engine**. The engine includes the fundamental principles, philosophies, and approaches that drive the overall strategy and the types of innovations it includes.

Working with the Map:

• **Focus on the strategies to build Foresight.** Each row represents a strategic scenario. Work across the row to explore the signals of innovations in this scenario. Then look for the innovations that are most important for your organization. How are they likely to change the way you do business?

• **Trace a path through the map to provoke Insight.** Sometimes the most important insights come from connecting several innovations across the map. Draw a line through signals that seem most important and tell that story to your colleagues. Which strategies are easiest for you to adopt? Which provide the greatest challenges to your organization?

• **Explore the challenges and innovations to guide Action.** The back of the map highlights key sustainability challenges: health, climate, human rights, water, economic well-being, biodiversity, and food. Think about what your organization does: the services it provides, the products it delivers, or the causes it promotes. How might you redesign these to take advantage of sustainability innovations—and meet these critical challenges in the next decade?

SUSTAINABILITY OUTLOOK 2020

COMMONS

Self-organizing communities of interest around shared vulnerable resources address issues of sustainability through participatory solutions. These new commons are at the heart of a bottom-up reorganization of society, disrupting traditional markets and government programs and providing human-centered innovations that contribute to sustainability—and a new civic society.

MARKETS

Market-led sustainability leverages market strategies to manage the ecosystems and improve social conditions at all levels—from households to farms, factories, cities, and the planet. Market incentives drive consumer and corporate behavior alike, aligning work and play, public and private life with changing environmental realities and human needs.

POLICY

In the face of rapid deterioration of the environment and the global human condition—as well as recognizing the slowness of the markets to drive fundamental behavioral changes—governments intervene with regulation and funding of programs aimed at control and remediation.

SCIENCE & TECHNOLOGY

Most of society's resources are mobilized to support scientific and technological solutions to sustainability dilemmas—creating new economic engines and stimulating a global drive to innovate ahead of ecological and social crises. The redirection of resources, though, may exacerbate social injustices.

HUMAN WELL-BEING

The individual experience of health, happiness & identity

NEW POLITICAL IDENTITIES

Niche groups + social networking tools = powerful new civic actors

- Biocitizens
- New diasporas
- Transgeographic citizens
- Big-box retail watchers

THE PUBLIC'S HEALTH

People use new technologies and commons models to collectively manage public health

- Volunteer professional health providers
- User-generated health databases
- Decentralized health solutions
- Bottom-up investment plans

HUMAN RIGHTS COMMONS

Distributed monitoring and protection of human rights reduces abuses worldwide

Humans become commodities? Tradeable body parts? Tradeable IDs?

GREEN HEALTH

Mature eco-health literacy drives new "green filters" on health practices and purchases

iTunes is the #1 music retailer in U.S.

MANDATORY HEALTH SCREENING

"Big brother is taking your pulse"—for all travel, employment, citizenship

GLOBAL PUBLIC GOODS

International institutions support shared societal resources, though not all discourses agree

- Guaranteed living income
- Public health
- Information access
- Political voice

SUSTAINABLE CHILDREN

Simulation models of children's health and life trajectories guide early care, policy, and—in aggregate—social planning

HIGH-TECH PERSONAL MEDICINE

Handheld devices provide personal access to medical records, diagnostics, diet recommendations, and suggestions for traditional as well as Western medical remedies

Distribution of people who profess extended-self attitudes

CULTURE AND SOCIETY

The ways we live together in communities

LITTLE SISTER IS WATCHING

Lightweight sensor networks + mobile sensing devices = bottom-up environmental monitoring

- Footprinting, of self and neighbors
- Measuring impacts of human activity
- Input to ecosystem modeling

INNOVATION FROM THE MARGIN

- Urban squatters and slum dwellers
- People with disabilities
- Displaced persons

SUSTAINABLE CITIZENS

Personal self-interest will focus sustainability efforts on local communities

Fragmentation of metrics, options, and marketplace rewards creates sustainability fatigue?

MARKETS IN THE METAVERSE

Digitization of media and rise of virtual lifestyles become a strategy for lowering environmental footprints and reducing physical consumption

VALUES AND VALUATION

- Cap-n-trade markets
- Millennium Development Goals
- Human and social capital
- Health credits
- Biodiversity markets
- Personal footprinting
- Sustainability dashboards

LANGUAGE PRESERVATION

As localism grows, language preservation movements proliferate—and trigger global debate

MANAGED MIGRATION

Global migration strategies and policies in response to climate refugee politics, population imbalances, and shifting labor needs

LEARNING ECOLOGIES

Online tools support global learning curricula—with everything from visual books to virtual worlds to simulation and gaming

PERSONAL LIFECYCLE TOOLS

Tools to help individuals gauge—and manage—their ecological and economic impacts, using lifecycle models

EXTENDED HUMAN CAPACITY

People experiment with diet, pharmaceuticals, implants, genomics, and lifestyle to extend their senses, physical and cognitive abilities, social reach, and ultimately their lifespans

SOCIALLY RESPONSIBLE GEOMAPPING

Scientists and citizens geo-tag zones of hazard and human rights abuses

- Toxicity and health risks
- Crime and physical danger
- Gender and racial discrimination

MOLECULAR MANUFACTURING

Working with materials at the molecular scale reduces waste, supports small-scale manufacturing—and poses unknown threats

THE ECONOMY

The production, distribution & valuation of goods & services

OPEN ECONOMY

Open tools and platforms disrupt traditional industries with P2P production and distribution—and commons-based property regimes

FINANCIAL COMMONS

- Regenerative commerce protects local economies
- Micro-venture capitalists create new global funding network
- P2P banking fosters community and commercial growth

OPEN-SOURCE DESIGN

Public wikis and online reputation systems link to real-time practices, places, products, and services

GLOBAL E-UNIONS

Distributed online social networks negotiate transnational labor agreements

REAL-TIME FEEDBACK

Tools for transparency enable immediate risk-mitigation and strategy adjustment

IMPACT ACCOUNTING

Future impacts on the environment, communities, and human health are modeled and included in business accounting

ECOSYSTEM SERVICES MARKETS

Global and local value assigned for personal, regional, and corporate trading in:

- Carbon sequestration
- Crop pollination
- Flood control
- Soil fertility
- Water provision
- Biodiversity

NEW CORPORATE STRUCTURES

New corporate actors create new kinds of markets

- Social entrepreneurs
- Hybrid models
- B-corporation

SUSTAINABILITY LABELING

Voluntary eco-labeling practices evolve into mandatory eco-, human-rights, and social-impact labeling standards

REDISTRIBUTIVE CARBON TAX

Individual and corporate income tax is replaced by carbon tax—you burn it, you buy it

LOCAL VALUE POLICIES

Policy mechanisms protect local value

- Commerce and labor
- Health and culture
- Natural resources and ecosystems

UNDEVELOPMENT POLICIES

Nations experiment with incentives for "undeveloping" specific regions to support both quality of life and biodiversity

SVVS

Silicon Valley-style innovation brings radical new technologies, infrastructure designs and service models to the world of mobility

ECO-SENSOR NETWORKS

Embedded environmental sensors, networked research stations, and science satellites enable continuous environmental monitoring—and automatic intervention

LOW-IMPACT ROBOTICS

Semi-autonomous, mobile systems offer low-impact alternatives for military operations, agriculture, transportation, and myriad institutional tasks

SUSTAINABLE "LEVITTOWN"

Experiments with green building and planned communities drives rapid innovation in construction, housing, and community services

- Las Gaviotas
- Masdar City
- Destiny, Florida

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INFRASTRUCTURE

The built environment & mechanisms that keep it going

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NATURAL RESOURCES

The range of materials we use to sustain human activity

P2P RECYCLING

Online match-ups focus on reducing waste

P2P ENERGY

Distributed guerrilla networks dismantle national grid and redistribute energy production

MICROPOWER MARKETS

Small-scale power solutions—such as small wind-based generators and bio-fuel cells—produce a growing share of global energy

WALLSTREET AS WATCHDOG

Entire stock exchanges emerge to trade sustainability-focused companies and instruments

REINSURANCE POWER

Pressure from the reinsurance industry accelerates adoption of sustainable strategies and resiliency

AGRICULTURED ORGANISMS

Agricultural and biological innovations—lichen, algae, switch grass, even new species—help address food and fuel challenges

SYNTHETIC BIOLOGY

Bioengineering matures, with new markets for biomaterials and IP

- Biomimetic designs
- Engineered ecosystems
- Bio-hacked bacteria

BIG BUSINESS, BIG SCIENCE

New business models focused solely on global innovation for sustainability channel vast amounts of R&D funding

CRITICAL RESOURCES

Critical resources (oil, water, fisheries) collapse due to overuse?

RENEWABLE PORTFOLIO STANDARD

Governments support a flexible, market-driven policy to ensure that a minimum amount of renewable energy is included in the portfolio of utilities

FOOD WEB PROTECTIONS

Governments intervene to protect the food web from

- Regional food deserts
- Overforaging
- Species extinction
- Food chain disruptions

IT'S ALL GARDENING NOW

As Daniel Janzen argues, there is no footprint-free world, and all nature needs to be carefully managed and maintained

ENDANGERED ECOSYSTEMS

Eco-science helps shift legal protections from individual endangered species to ecologies of interdependent plants and animals

EDUCATION FOR SUSTAINABILITY

Results-oriented ecological and social-impact curricula are standard in public education

LOCALISM VS. GLOBALIZATION DEBATES?

WASTE = RESOURCE

Cradle-to-cradle design + molecular technologies turn waste into leading source of raw materials

NANOPURIFICATION

Nano-scale purification can remove toxins and viruses *in situ* at extremely low costs

CULTURED MEAT

As arable lands are disrupted, research on lab-grown meat increases

RESOURCE NATIONALISM

Following the lead of Venezuela, Bolivia, and the Sakhalin Peninsula in Siberia, more countries and regions nationalize their resources

ECO-SIMULATION

Sophisticated simulation tools model ecologies, communities, regions, and global dynamics

MOONLANDING AS MODEL

Integrated R&D programs, resembling the space-programs of the 60's, guide innovation and adoption of new technology

ECOSYSTEMS

The biologically integrated worlds we live in

BIOSPHERE RIGHTS

"Declaration of Biosphere Rights" inspires participatory enforcement of

- Zero-footprint goods
- Renewable energy
- Biodiversity and ecosystem protection

BIOTRUSTS

Institutions created to protect biological life from privatization, IP patenting, and biopiracy

NEW CIVIL SOCIETY

Social networks and solutions-commons foster rapid implementation of sustainability and social justice strategies

SMOLOGY

Enabled by wireless technology and quantum encryption, plebiscites transform "command and control" to "poll and control" policy

GOVERNANCE BY NGO

NGO networks challenge government monopolies in policy setting, resource distribution, and even enforcement

BOTTOM-UP GREEN GOVERNANCE TURNS INTO GREEN FASCISM?

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GOVERNANCE

The rules for social & political behavior

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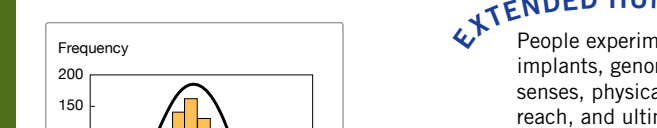
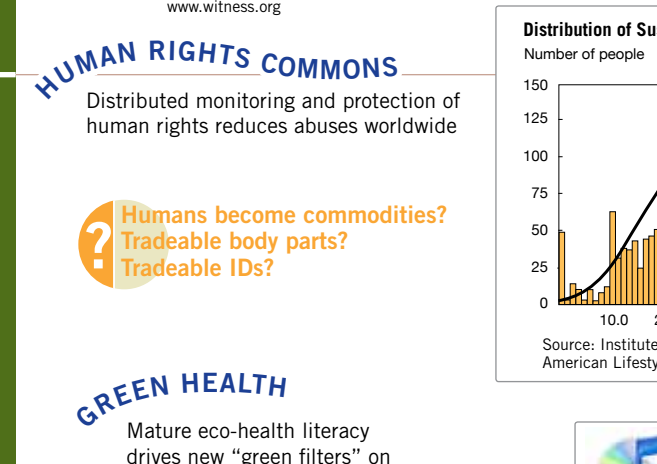
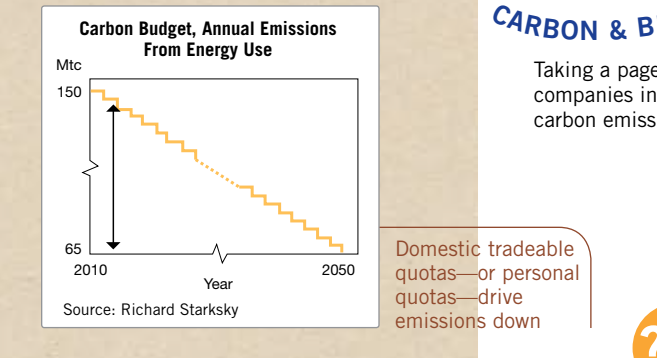
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BOTTOM-UP GREEN GOVERNANCE TURNS INTO GREEN FASCISM?



Domestic tradeable quotas—or personal quotas—drive emissions down

Governments at all levels establish emission quotas which form the basis for emission trading and set a framework for punitive action

Design is Policy

- Biosphere management
- Guided R&D
- Planned demographics
- Bioregional design
- Megapolitan planning

Massive projects alter atmospheric and ocean chemistry, aimed at preventing global climate disaster

The Svalbard Global Seedbank protects plant species from "doomsday" scenarios

Integrated standards for field data across disciplines

As we look out toward 2020, we come face-to-face with the challenge of sustainability. We see growing uncertainty about the potential for individual health and happiness around the world. We see disruptions in our social and economic systems. We struggle to understand the impacts of climate change.

Facing these challenges, we recognize the need for innovation. We know this innovation must go beyond sustaining our current business models or even surviving as organizations. It must also ensure the well-being of individuals, our collective society, and the ecosystem within which we all seek to thrive. This is the very definition of sustainability.

Yet there are so many perspectives on sustainability. We can view it through such diverse lenses as human health and well-being, society and culture, the economy, our infrastructure and natural resources, multiple embedded ecosystems, and of course, governance. Each of these perspectives creates a slightly different definition of sustainability—and poses a somewhat different challenge.

At the same time, we know that there will be profoundly different strategies for sustainability, based on different philosophies that cut across the various perspectives.

How do we make sense out of this diversity of innovation?

The *2008 Sustainability Outlook Map* answers this question by focusing on four main strategies that capture possible societal responses to the demands for sustainability:

- A **Commons** strategy dominated by bottom-up, participatory solutions.
- A **Markets** strategy focused on alternative capitals, financial incentives, and market dynamics.
- A **Policy** strategy that leverages legislative interventions, ranging from setting market standards to command-and-control administration.
- A **Science and Technology** strategy that propels sustainable behavior and operations through technological innovation.

Each of these strategies represents a distinctive approach to sustainability, with its own set of innovations for everything from health and education to the economy and the environment. Together they offer us a grid for making sense of the coming decade.

In the end, environmental, social, and economic sustainability cannot be separated. A sustainable planet must include a sustainable human civilization—resilient human systems that respect the complicated relationships among poverty, human rights, economic development, environmental health, and human success. This map is designed to be a guide to this endeavor.

HEALTH

The Challenge:

The health paradox: as our life-spans increase, we face a growing variety of possible threats to our biology. Some of these threats come from modifying our world without thought of consequence. Nearly everything we touch—the air we breathe, the food we eat, the products we handle—relies upon synthetic chemicals or complex engineering. And as we gain a better understanding of human biology and develop better tools for monitoring our environments and ourselves, we see indicators of a general decline in human health globally. How do we stay healthy when our bodies are in continuous experimentation with our rapidly transforming surroundings?

Innovations on the Horizon:

- Enabled by networks and databases, **The Public's Health** is managed collectively from the bottom up.
- **Green Health** consumers drive demand for products and services that have been developed with consideration for our physical well-being.
- National governments come together to provide health-care as a **Global Public Good**, ensuring that we all receive basic services at a minimum.
- Individuals take their health into their own hands empowered by **High-tech Personal Medicine** through mobile devices.

Example | Voxiva provides mobile applications that allow patients and healthcare providers in rural areas to access health care databases:

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



Source: <http://www.cominit.com/en/node/134885/307>

CLIMATE

The Challenge:

A complex set of interacting systems, the climate changes slowly but inexorably. Many of the underlying geophysical processes display profound lag; climate disruptions we see today reflect atmospheric and oceanic changes from two or three decades ago. As we look at changing weather patterns, temperatures, and water levels—as well as resulting changes to soil quality, animal habitats, bird migration paths, and more—we recognize the imprint of human activity. We are transforming the climatic context that has enabled life to flourish into one that is unstable, uncertain, and possibly uninhabitable over time. How do we find solutions for mitigation and adaptation?

Innovations on the Horizon:

- **Open-source Design** brings together the diversity of expertise necessary to tackle our shared climate problem.
- Businesses and institutions that impact the planet's climate are kept in check through **Carbon Trials**.
- A **Carbon Tax** turns the economy on its head, cascading incentives to reduce emissions throughout the system.
- Individuals use **Personal Lifecycle Tools** to live a more climate-conscious existence.

Example | The Carbon Tax Center is a U.S.-based grassroots organization consolidating momentum for implementing a carbon tax:

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



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

HUMAN RIGHTS

The Challenge:

In a world of globalization, cultures converge and conflict, resulting in a lack of shared understanding of human rights. At the same time, technologies of communication and information (from camera phones to the Internet) make it possible to document human rights abuses and share the images with the world. Due to ongoing dynamics of power and influence in an increasingly complex system, efforts to protect society may unintentionally subvert individual and collective freedoms. How do we ensure that human rights are understood, respected, and protected?

Innovations on the Horizon:

- **Human Rights Commons** enable the collaboration of people all over the world in protecting and promoting human rights.
- As company stock value takes into account human rights, there is a new role for **Wall Street as Watchdog**.
- Increased international coordination on sustainability leads to a stronger **Global Policy Framework**, including policies to advance human rights.
- **Socially Responsible Geomapping** enables people to track where human rights abuses are taking place around the world.

Example | Crisis in Darfur is a layer in Google Earth where the U.S. Holocaust Memorial Museum's Genocide Prevention Mapping Initiative has provided information to map destruction throughout Darfur:

http://earth.google.com/outreach/cs_darfur.html



Source: http://techyum.com/2007/04/googlemapping_atrocities_in_da.html

WATER

The Challenge:

Water is at once utterly commonplace and extraordinarily precious. Because water is an essential need for all forms of life, demand from individual, collective, and institutional use increasingly puts pressure on fragile supplies. Access to clean water is considered a human right by many, setting up conflict when supply is not available where and when demand calls for it. New technologies may provide access to previously unavailable sources, even as over-consumption and pollution deplete aquifers. How do we ensure that our supply of water is clean and accessible by all who need it?

Innovations on the Horizon:

- Individuals know how their behaviors impact the global water supply and can adapt accordingly when **Little Sister is Watching**.
- A shift in consumer demand from products to services leads to **Downsizing** material production and reduction in the water used in manufacturing processes.
- Governments examine entire **Endangered Ecosystems** to inform policy development for effective water distribution.
- Next-generation living designs lead to the development of **Sustainable "Levittowns"** and smarter water systems.

Example | Pavements made from pervious concrete allow for storm water to pass through, replenishing groundwater and decreasing runoff:

<http://smokepointconcrete.com>



Source: http://www.smokepointconcrete.com/company/press/stratford_place.php

ECONOMIC WELL-BEING

The Challenge:

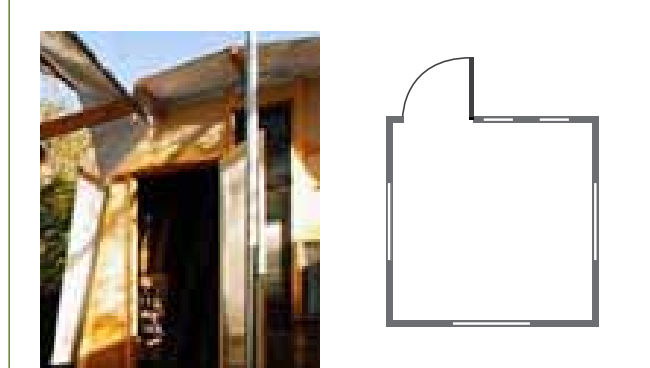
Wealth is a basic building block for human well-being. In a world of haves and have-nots, the existing gap is reinforced and at times exacerbated by unequal access to opportunities and environmental disruption. At the same time, new innovations, both technological and social, offer alternative models for collaboration, organization, and foresight. These innovations may offer ways to deal with long-standing dilemmas, but can introduce new dilemmas of their own. Throughout, one question dominates: How can every individual secure enough wealth to lead a good life?

Innovations on the Horizon:

- **Global e-Unions** enable workers to have a stronger collective voice and effectively negotiate and increase their economic worth.
- New perspectives are represented in the world economy as **Innovation from the Margin** leads to business opportunities.
- Through **Managed Migration** policies, governments address issues facing displaced individuals, including discrimination and inequity.
- **Eco-Simulations** enable people to see the potential impacts of their decisions on the economic well-being of others.

Example | Katrina disaster innovation resulted in easily assembled, recyclable, and inexpensive **cardboard-based shelter designs**:

<http://www.dexigner.com/architecture/news-g5344.html>



Source: <http://www.dexigner.com/architecture/news-g5344.html>

BIODIVERSITY

The Challenge:

As demand for material inputs continually increases, transformation of natural habitat into cultivated property seems inevitable. Careless development and unintended consequences can lead directly to the elimination of unique life forms as well as damage to complex ecologies. Reduced biodiversity means increased environmental brittleness. This has direct consequences for human activities, undermining ecological services such as oxygen production and new drug discovery. Disrupted and collapsed ecologies are more likely to produce invasive pests (and potentially zoonotic pandemics), and can damage neighboring ecosystems. How do we ensure the resiliency of our biosphere?

Innovations on the Horizon:

- **BioTrusts** institutionalize the rights of biological forms and ensure their preservation.
- **Ecosystem Services Markets** provide the environment with a place in the economy in an attempt to keep it from being externalized and undervalued.
- When push comes to shove, government steps in with **Undevelopment Policies** to restore biodiversity.
- People versed in **Planetary Mark-up Language** contribute their share of knowledge about the earth to co-develop ecosystem solutions.

Example | Colombia is carrying out a **debt-for-nature swap** in which part of Colombia's debt to the United States was canceled in exchange for funding a trust and supporting organizations to preserve its tropical forests:

http://www.panda.org/news_facts/successes/index.cfm?uNewsID=13148



<http://www.flickr.com/photos/31536282@N00/2601408480/>

FOOD

The Challenge:

The path of our food, from the seed to the plate in front of us, depends on a delicate system of interrelated factors that are not always visible to the consumer. From the role of bees in pollination, to seasonal harvest timings, to the resilience of crop diversity in the face of unexpected blights—the weakening of any of these factors could cause our food system to fail. Climate change, unsustainable development, and industrial waste are all disrupting local food webs and threatening global food supply. How can we protect our complex and fragile system of food production and distribution?

Innovations on the Horizon:

- **P2P Food** localizes certain food systems, making them more resilient while bolstering community resources.
- Organizations measure and mitigate their impact on the ecological foundations of food production through **Impact Accounting**.
- Governments and organizations operate sustainably within a framework of **Food Web Protections**.
- **Cultured Meat** offers an alternative approach to serving meat without the negative impacts on animals, land, water, and air associated with farming cattle.

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

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



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

Glossary

The language of the *Sustainability Outlook Map* may be unfamiliar in definition or usage. Here are some terms we want to make sure you recognize:

Biocitizen: Individual taking political and identity interest in health-related issues.

Bio-hack: Genetic modification, particularly in a quick-and-experimental way.

Biomimetic: Industrial design following the patterns of nature, especially natural processes.

Biopiracy: Developed nation companies patenting and making proprietary various uses of plants found in developing nations.

Cradle-to-Cradle: Design process emphasizing material reuse and "upcycling" (where recycled products are as or more valuable than previous generation).

Food Desert: Urban district with little or no access to foods needed to maintain a healthy diet (but may be served by fast food restaurants).

Markup Language: Any artificial language used to define how content is structured and displayed, e.g. HTML (hyper-text markup language) is used to construct web pages.

Mashup: Digital media concept mixing two or more disparate sources to create a mixed whole.

New Diaspora: Emerging model of diffuse communities, sharing identity but not geography, usually linked by the Internet.

P2P: Peer-to-peer, a distribution mechanism without centralized control, user to user.

RFID: Radio Frequency Identification, a technology using small chips able to carry individual data about a package, product, or (potentially) a person.

Smartmob: A self-organizing group of people, mediated through social technologies, capable of complex emergent behavior.

Tagging: Assignment of keywords to media, usually by both creators and users, allowing for flexible filtering.

Urban Squatters: Communities emerging in abandoned structures or open areas, ignoring or violating existing property ownership.

Wiki: A collaboratively-edited Web site, usually in order to gather best knowledge from participating readers, e.g. Wikipedia.

Open-Source: Production method where the instructions and component information (e.g., software source code) is freely given away, allowing for individual modification, with the caveat that all future modifications should remain freely available.