2004 Map of the Decade

the future is an intersection of trends and aspirations, of memory and imagination

History sets the course, but innovation and improvisation create discontinuities. Each year, the Institute for the Future (IFTF) seeks to map this sometimes-confusing grid of probabilities and possibilities to create a framework for thinking about the choices we face right now, today.

The *2004 Map of the Decade* is a snapshot of the last year's research at IFTF. It focuses on five key areas that we have tracked in detail: markets, places, people, practices, and tools. At the same time, it highlights six big shifts that will play a formative role in the future. Together, these form a matrix that can help make sense out of the world we're co-creating, day by day.

We hope this map can provide a perspective for the many important conversations that will take place this year—in boardrooms and meeting halls, in conferences and community spaces. Please feel free to contact us if we can contribute in other ways to these conversations.

Institute for the Future

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markets

Location infrastructure takes off

The World Wide Web has created a new platform for social and business relationships. In the next decade, a new geospatial web will extend that platform, linking real-world locations and geo-based information into the virtual world. This self-organizing infrastructure will likely grow rapidly from the bottom up (much the way the early Web did) as location-based tagging of Web content becomes routine and even automated.

Cooperation grows new market structures

Supported by network technologies plus new models of cooperation, new structures for conducting commerce are growing. These range from the now familiar peer-to-peer auctions to peer production networks. In fact, Walter Powell (author of "Neither Market Nor Hierarchy") argues that the economic structure of the future is a network and not a market at all.

Capitalism becomes fragmented

Even as capitalism becomes the world's dominant economic system, it is beginning to splinter into regional "flavors," with distinctly different drivers, value orientations, timeframes, and politics. Entrepreneurial capitalism in the United States, cultural capitalism in Europe, and network capitalism in Asia will set the stage for unanticipated global trade tensions in the coming decade.

Global production networks grow

A growing share of global trade is conducted through networks in which portions of a product are produced by a number of different suppliers globally. As these networks become the growth infrastructure for the global economy, cultures and companies that excel in managing networks will likely have the competitive advantage.

Global jobs shift

Over the next decade, many white-collar jobs will begin to shift to the most educated of developing economies, with India as the leading benefactor. The result will be increasingly polarized wealth in industrial nations, with growing middle-class purchasing power in developing nations.

Jobs and hobbies combine

Workers are looking for more opportunities for self-expression. They will increasingly focus on their hobbies and other leisure-time activities. As they try to bring these "passions" into the workplace, leading-edge companies are looking for ways to incorporate worker interests into formal job descriptions. At the same time, many workers are developing second careers that build on their hobbies. The result: "jobbies."

Space imaging taps a global market

While national security and privacy concerns have limited commercial applications of remote images from space in the past, global trade agreements and other policies have resolved the most serious issues, and several companies have begun to offer earth-observation data for commercial use. Over the next decade, this information will find widespread use in everything from marketing to real estate development.

Nanomaterials grow consumer markets

The first wave of the new nanoscience-based products will be novel materials that have very practical effects. Many of these innovations will be invisible to consumers, but some will provide competitive advantage in consumer markets—particularly in textiles, cosmetics, and digital displays.

places

Public spaces are put to new uses

The cybernomadic culture will redefine public spaces over the coming decade as mobile workers, hyper-connected young people, and digital creatives begin to occupy them in new ways. Workspaces will be unbundled, with workers choosing a variety of public and private spaces for different tasks. The result will be not only a hollowing out of traditional workspaces but a "niche-ification," and even privatization, of public spaces.

People leverage the virtual world for real-world meetings

The physical and digital worlds will increasingly blend as people use online tools to facilitate meetings in physical spaces. Web sites such as Meetup.com are organizing everything from sewing circles to political campaigns, combining a global network community with local community meetings. Increasingly, these networks will form the basis of cooperative local action on global issues.

Symbolic economies bleed into the real-world economy

Massively multiplayer online games such as *EverQuest* have created elaborate symbolic worlds that mimic all the complexity—and commerce—of the real world. Increasingly, these economies are merging into the everyday economy as players hire real-world people to "work" in their online shops and real-world legal battles for virtual-world property turn up in the courts. This merging of symbolic and real economies will create new markets and new forms of marketing.

The place–space nexus is the new cultural frontier

Linking information to specific geographic locations will perhaps be the dominant cultural endeavor over the next decade. This information will include both *choros* (the social narratives that give places their meaning) and *topos* (the data that describe the physical terrain). It will give rise to new art forms, commercial applications, and forms of social interaction. It will also enrich and enhance the personal mental maps that people use to organize their daily lives.

The geoweb links information to location

The infrastructure for information-rich places is the emerging geospatial web. This web will create new measures of local health and wealth, providing new kinds of indicators and new tools for gathering, analyzing, and visualizing them. The ability to interpret this new layer of geodata will be an important new skill set for both professional and personal activities.

Sensors embed data in infrastructures

Sensors—from security cameras to RFID tags and smart dust—will continue to spread throughout the physical world. They will not only provide the foundation for machine monitoring of many aspects of commerce, they will also become new tools of social connectedness and presence management. The smallest, smartest of these sensors will find their first applications in securing critical infrastructures such as oil pipelines, energy grids, airplanes, and seaports. But over time, they will gradually contribute more and more to the *choros* and *topos* of places and objects.

Space exploration gets its second wind

As China launches its first manned space flight and takes aim for the moon, space again appears as a frontier for exploration—and the commercialization of new technologies. Expect China to focus on building a space infrastructure made up of technologies that can be repurposed for earth-bound commercial applications.

people

The elderly redefine old age

Worldwide, the elderly population will grow significantly—both in number and share. In many European countries, the share of people reaching their 90s will justify new age cohorts that break the elderly into new segments. Even developing nations in Latin America and Asia can expect to see their elderly populations double.

Boomers choose globally mobile retirement

Having lived their adult lives in a world of global mobility and connectivity, aging baby boomers will not settle for the traditional retirement communities of their parents. Neither will they settle for traditional retirement activities; nearly two-thirds say they don't plan to stop working. Some will throw themselves into causes; others will move back to the towns where their grandparents grew up or to developing countries where they can combine low-cost living with a sense of "giving back." Still others will take to the roads and airways, either Winnebago-ing or seeking global cultural icons in places like Afghanistan.

A new creative class dominates work, entertainment, and city life

Dubbed the "creative class" by Richard Florida, scientists, engineers, artists, writers, and entertainers will continue to drive the economy in industrial nations. As innovation becomes the key to economic growth in these countries, these creatives will be in greater demand in the workplace as well as in cities. Already towns like Memphis, Tennessee, are revamping everything from their zoning laws to their marketing brochures to attract these desirable citizens.

The "self" becomes the big project

In the last couple decades, workers brought home project-oriented skills and tools to help them manage their families and their daily lives. Over the next decade, they will turn these same skills and tools on themselves—their identities, their bodies, and their souls. Health will be a focus of attention for this work, supporting a burgeoning health economy beyond the bounds of traditional health care.

Technology supports an "extended self"

People will also grapple with managing their online identities and their remote presence, redrawing the boundaries between body and mind, flesh and spirit, and even machine and living being. As technology shrinks and finds its way into the body and as personal information and memory find their way into physical places and objects, the sense of self will extend beyond the body. Even setting aside innovations in nano-scale implants and molecularly constructed tissues, wearable technology and personal area networks will increasingly blur the boundary between self-as-body and self-as-digitally-distributed-awareness.

Genetic mapping creates a new biological citizenship

The first wave of the genomic revolution will be genetic testing, including screening for known genetic disorders and pre-testing for drug effectiveness. Combined with online support for all kinds of affinity groups, this trend will create visible populations who identify with their diseases. Already, people with similar disease profiles or prospects are banding together to create a form a biological citizenship, advocating for themselves on the basis of their common biological experience. Increasingly, these identities will define the relationship of these bio-citizens to their socio-political environment.

practices

A sensory transformation gives birth to the cybernomad

Cybernomads will introduce a new set of social, economic, and cognitive practices—creating a profound shift in human culture. At the basis of this shift is a sensory transformation, ushered in by the "decade of sensors." While the 1980s was the era of computing and the 1990s was the era of communications, this coming decade will be the first in an era of greatly extended sensing. Human evolutionary history tells us that such major shifts in sensory practices always precede major cultural transformations. The cybernomadic shift will be no exception.

Workers get organized for mobility

Workers are developing several distinct patterns of mobility that define when and how they access resources. Four typical patterns are emerging based on 1) focal points, 2) spaces bounded by institutional limits, 3) travel routes, and 4) ad hoc and opportunistic strategies.

Fragmenting citizenship challenges companies, NGOs

The rights and responsibilities of citizenship are being unbundled as people move more freely through global "latitudes of citizenship," as Aihwa Ong calls them. The responsibilities and rights of citizenship will increasingly be negotiated, not through nation-states, but through corporations and nongovernmental organizations.

Social software builds social capital

Social software is creating a great experiment in group-forming networks (GFN), and David Reed, at MIT, has argued that the value of these GFNs grows much faster than the value of other types of networks. In fact, it grows exponentially. As this software permeates daily life, companies will increasingly measure their workers' network connections to assess employee and organizational value.

Consumers take on more responsibility, more risk

Today's increasingly engaged consumer can be defined by three bellwether behaviors. Self-agency means they are acting on their own behalf, eschewing intermediaries. Self-customization means they are tailoring products and services to their own needs and even belief systems. Self-organization means they are finding ways to talk to one another and organize to get their needs met. Consumers are thus assuming more responsibility—and more risk—in the decisions they make.

New diagnostics map the health landscape

New diagnostic technologies—from imaging systems to molecular-level genetic testing—will be boom markets over the next decade. All these tests, of course, require expert interpretation—which is likely to drive not only higher health care costs but also new kinds of medical practices.

Biosurveillance creates a more sentient society

At the leading edge of sensor technology are bio-sensors. These sensors will find applications in everything from medical monitoring to threat detection in the face of global epidemics. Hand-in-hand with sensing technology will be analytical tools that use fuzzy logic and other artificial intelligence techniques to discern signals from noise in the information being collected by sensors. While monitoring raises the well-known host of privacy issues, it also offers the possibility of a more sentient society—with the truly evolutionary advantage that it suggests.

tools

Navigation is automated

Thanks to GPS and other positional technologies—as well as RFID and tagging technologies—machines will increasingly manage the task of moving people and objects around. The leading edge of automated navigation is automotive telematics, such as OnStar. By 2010, over 100 million vehicles, or 70% of new cars, will likely have telematics systems. Meanwhile, digital tagging of shipping containers, palettes, and even cartons will help move goods worldwide with less human intervention.

Objects and places get Internet addresses

The next-generation Internet protocol, IPv6, will greatly expand the availability of Internet addresses. This will allow more companies to offer Internet-enabled devices. But beyond devices, objects and even places will be tagged with tiny processors and Internet addresses, allowing them to communicate.

Open source grows

Once thought of as a hacker hobby, open source software and development tools continue to grow in popularity for commercial and enterprise applications. This year, for example, the Linux operating system is likely to be the targeted operating system for 60% of developers, while Windows drops to 40%.

Consumers get interested in RFID

To date, RFID applications have focused primarily on the logistics of warehousing and distribution. Applications that would touch consumers—such as item-level tagging of retail goods—have already triggered a strong backlash. However, as RFID drops in cost, consumer-friendly applications of the technology are likely. Expect consumer adoption to grow as RFID provides better ways for them to manage their health and security.

Design drives economic growth

Design will increasingly differentiate between commodities and high-value products, and tools that help designers prototype new systems will become important tools in the world of white-collar work. For example, 3D printers and ink-jet tools are likely to give office workers the ability to rapidly prototype and test new product designs on the desktop, paving the way for a creative breakout.

Machine intelligence grows from the bottom up

Advances in artificial life—programs that mimic the behavior of living systems like ant colonies and bee hives—are beginning to solve problems that range from congestion-free network architectures to management of factory-floor resources. Sometimes called swarm intelligence, this kind of machine behavior will be applied to a wide range of objects and devices in the environment. This pervasive form of computing will emerge out of the interactions of lots of small objects interacting to create complex, intelligent systems from the bottom up.

Ink-jet technology drives very small-scale manufacturing

Ink-jet printing is no longer just a publishing tool. It's rapidly becoming a manufacturing system for everything from batteries and displays to cheap organic tags, cDNA microarrays, and custom drugs.

2004 trends

cybernomads

From mobility to a new human identity

Cybernomads are what we are becoming as we integrate our movements in a globally connected world with our thinking, our social interaction, and our fundamental sense of who we are.

collective action

From competitive to cooperative strategy

Long ignored in our science of evolution as well as our marketplace activities, cooperation is emerging as the new frontier of strategy.

the new capital

From free markets to value networks

Having won the world, capitalism will now take on new faces—the most innovative of which emphasizes the value of networks over strictly free markets.

creative complexity

From roles and rules to complex forms of self-expression

For humans and machines alike, the focus will be the emergent intelligence that occurs as simple rules and lots of interactions create complexity and innovation.

mapping

From disembodied data to embodied visualizations

As abstract data gets linked to real places—and real human bodies—we'll begin to see our world and ourselves in new ways.

the very small world

From microns to nanometers

Technology will turn its attention to ever smaller scales, transforming materials, manufacturing, medicine, and ultimately computing and communication.

markets

INFRASTRUCTURE OF LOCATION-BASED SERVICES

- Wireless
- Geopositioning
- Location-linked data

- People locators
- Event locators
- Resource locators
- Device locators

ECONOMICS OF COOPERATION

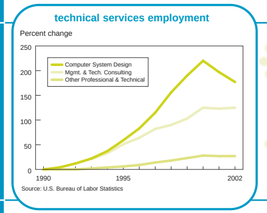
- Peer-to-peer markets
- Agent-based production networks

A BATTLE FOR THE COMMONS
- Science
- Network access
- Art

FRAGMENTED CAPITALISM

U.S.	Entrepreneurial Capitalism
Europe	Cultural Capitalism
Asia	Network Capitalism

GLOBAL JOB SHIFTS



not just manufacturing!

"JOBBIES"

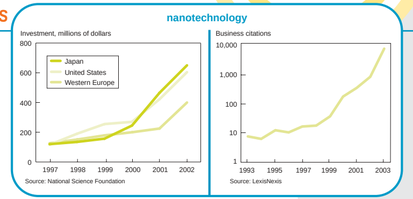
jobs + hobbies = self-expression at work

SPACE IMAGING

EARTH-OBSERVATION DATA FOR:
- Epidemiology
- Environmental land management
- Infrastructure protection

NANOMATERIALS

- Coatings
- Textiles
- Cosmetics
- Health
- Displays
- Packaging
- Energy



places

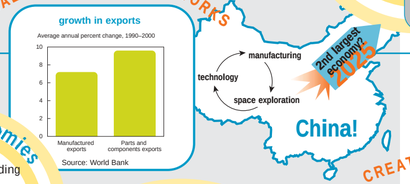
REPURPOSING OF PUBLIC SPACE

- Unbundling workspaces
- Privatization & niche-ification
- Subversive play

PHYSICAL–DIGITAL MEETING SPACES

- Shared interest groups
- Online political organizing

GLOBAL PRODUCTION NETWORKS



symbolic economies

- Cross-world branding
- Real-world legal battles for virtual-world property
- Next-generation social environment

place–space nexus

alternate realities

CHOROS
- Multilayered places
- Social narratives
- Digital "songlines"

TOPOS
- Geocoded data
- Geographic information systems (GIS)

geoweb

INTERNET GEOGRAPHY
New indicators for:
- Economics
- Social networks
- Technology diffusion
- Health

geocoded blogs

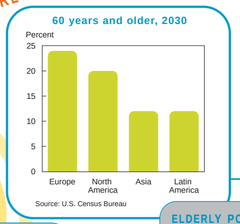
PHYSICALLY EMBEDDED DATA

- First applications of smart dust = protection of critical infrastructures

SPACE EXPLORATION BY MICROCRAFT

people

MORE ELDERLY WORLDWIDE



globally mobile boomers

A TAXONOMY
- The Fast Rich
- The Keep-Working Folks
- The Cultural Seekers
- The Winnebago Tribe

ELDERLY POPULATION in 2030

China	290 million
U.S.	85 million

- Monumental support
- More demands for health care
- New attention to "civic virtues"

CREATIVE CITIES

revamping public places & increasing social diversity

NEW KINDS OF CITIZENSHIP

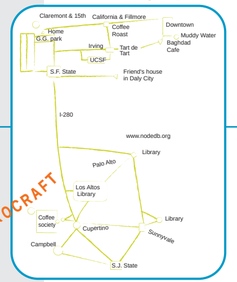
CITIZENS OF:
- Wealth
- Affinity
- Physical–digital spaces

NEW RESPONSIBILITIES
- Corporations
- NGOs

GROWTH OF CREATIVE CLASS

- Creative workers = scientists, engineers, artists, writers, & entertainers
- Reinvention of retirement
- "The Experience Lifestyle"

MENTAL MAPS OF PLACE & SPACE



SELF AS A PROJECT

- Health identities
- Online identities
- Self as a part of a larger social organization

GENETIC MAPPING

- Chronic diseases
- Hereditary risks
- "Biological citizenship"

THE EXTENDED SELF

- Wearables
- Personal area networks
- Medical implants
- Non-medical implants
- Electroactive polymers for "bionic muscles"

biosurveillance

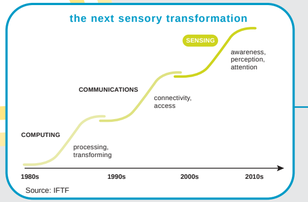
- Threat detection
- Discern signals from noise
- International cooperation

a more sentient society?

practices

sensory transformation

- Cultural
- Cognitive
- Economic

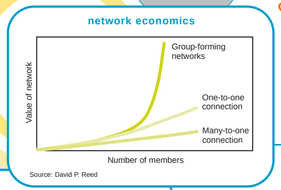


transitions are key

GROUP-FORMING NETWORKS

- People
- Information
- Places
- Objects

social capital

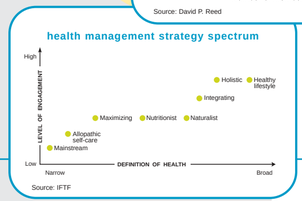


ENGAGED CONSUMERS

bellwether behaviors

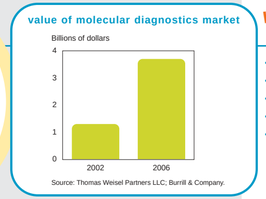
- Self-agency
- Self-customization
- Self-organization

burden of empowerment



NEW HEALTH DIAGNOSTICS

- Imaging technologies
- Molecular diagnostics

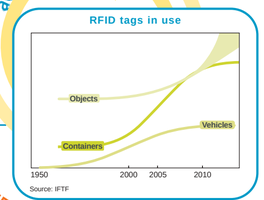


tools

NAVIGATIONAL TOOLS

- IPv6
- GeoURL
- RFID
- GPS

addressable world



A TYPOLOGY OF MOBILITY
People organized by:
- Focal points
- Bounded spaces
- Travel routes
- Ad hoc & opportunistic strategies

INTERPLANETARY INTERNET

SOCIAL SOFTWARE

REED'S LAW
Value of a group-forming network grows at 2^N

- "Friend-of-a-friend" network building
- Mapping enterprise networks
- Technorati

OPEN SOURCE

complexity & customization drive growth

CONSUMER-DRIVEN RFID

MANAGE:
- Productivity
- Privacy
- Presence

big potential for backlash!

DESIGN & PROTOTYPING

- 3D printing for rapid prototyping
- New visualization tools
- 3D scenarios

andy clark

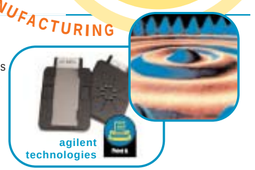
a deepening man–machine symbiosis

emergent intelligence

- Artificial life
- Smart objects
- Emergent computing

INK-JET MANUFACTURING

- Displays
- Batteries
- Cheap organic tags
- cDNA microarrays
- custom drugs



agilent technologies