Article

Virtual Sustainability

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Abstract: In four ways, massively multiplayer online role-playing games may serve as tools for advancing sustainability goals, and as laboratories for developing alternatives to current social arrangements that have implications for the natural environment. First, by moving conspicuous consumption and other usually costly status competitions into virtual environments, these virtual worlds might reduce the need for physical resources. Second, they provide training that could prepare individuals to be teleworkers, and develop or demonstrate methods for using information technology to replace much transportation technology, notably in commuting. Third, virtual worlds and online games build international cooperation, even blending national cultures, thereby inching us toward not only the world consciousness needed for international agreements about the environment, but also toward non-spatial government that cuts across archaic nationalisms. Finally, realizing the potential social benefits of this new technology may urge us to reconsider a number of traditional societal institutions.

Keywords: virtual world; online game; conspicuous consumption; telecommuting

1. Introduction

Capitalism prides itself on maximizing economic production, yet this is not the same thing as maximizing human welfare and may not be sustainable in the long run. The traditional alternative, Marxism, has degenerated into a rhetorical mask concealing the true ugliness of the Chinese oligarchy, and the term *state capitalism* is bandied about as if it were not an oxymoron. Thus, it seems infeasible at the present time to replace capitalistic institutions with something more benign, and we need to look for developments within the system that might ultimately have revolutionary consequences [1]. One

possible source of insights is the great diversity of virtual worlds that have been developed in the past fifteen years, many of them marketed as massively multiplayer online role-playing games (MMORPGs or MMOs). I have described many of them as *etopias*—electronic utopias that explore alternative cultures—and thus they may prototype future real-world societies as well as having their own impact on the existing civilization [2-5].

The most impressive example is *World of Warcraft* (WoW), which was launched late in 2004 and quickly grew to nearly twelve million subscribers in North America, Europe and China [6,7]. Using an ordinary Internet-connected personal computer, the user logs into one of about 500 servers to enter a *realm* (or *instance* or *shard*) of this gameworld. As many as 4,000 other people can be in this realm at the same time, each represented by an avatar, interacting with each other socially and economically. The formal game dimension of this virtual world is primarily represented by a series of 7,000 "quests", soon to be increased in the next expansion to 10,000, which are adventure missions conducted within a very complex mythology, that provide rewards of increased power, virtual goods, and virtual currency that can be spent to buy other goods from non-player vendor characters and from one of three well-stocked auction systems through which users sell virtual goods to each other. Many of these virtual goods are harvested from the natural environment or crafted from raw materials by users; for example miners sell metals to blacksmiths who turn them into virtual weapons and armor as in any "real" economy.

Essentially all advanced WoW players belong to guilds, cooperative groups that they create themselves, using well designed groupware systems to coordinate actions such as five-person team missions or raids with optimally 40 members but sometimes as many as 100. In May 2008 I used this guild system to hold the first major scientific conference inside an MMO, with as many as 120 avatars virtually co-present for the main sessions, although the human beings they represented were spread all the way from Australia through North America and Europe into Russia [8].

Some virtual worlds, notably *Second Life*, are not conceptualized as games, whereas others, such as *Entropia Universe*, lie between the game and non-game categories. The virtual architecture, goods, and groups inside *Second Life* are all user-created, employing tools for designing and assembling components, for example the walls of a building, uploading graphic images to give each surface the desired appearance. In addition, short computer programs can be written in a scripting language and inserted into virtual objects to make them perform an endless variety of functions. Some users have created their own games inside *Second Life*, but others have created virtual museums, attempted to launch small businesses, or built facilities for teleconferencing. For example, I myself have long managed a virtual island in *Second Life* for my employer, holding a number of very serious business meetings there. By latest count, I have spent at least one hundred hours exploring each of fifteen mostly gamelike virtual worlds, 2,400 hours in the case of *World of Warcraft* and 300 or 400 hours in several other cases. Thus this essay is based on much direct observation, as well as on theoretical analysis of the scholarly literature in this emerging area.

To be sure, only a tiny fraction of humanity currently inhabits these virtual worlds, and we cannot predict how significant this relatively new phenomenon will be in the coming decades. However, principles that we may easily discover inside them may also apply to other communications technologies, and they can be fertile environments for theory development. This essay will consider the most obvious topics, with the implication that others will be discovered as research progresses.

2. Worlds as Arenas for Status Competition

Whatever else it may be, society is a status structure in which individuals compete to improve their situations with respect to others [9]. A variety of social theorists have suggested that human society should be analyzed as a game [10-13], although this metaphor might fit some systems better than others, perhaps describing capitalism more accurately than the alternatives. In all societies, ostentatious gift-giving and conspicuous consumption are wasteful ways of asserting status, but they may be more significant in capitalist society where economic superiority is the prime measure of success [14-17]. For example, many people may invest in much larger and fancier houses than their safety and comfort require, in status competition with others in their community. The principle may be, "Big people have big houses". This wastes materials constructing the house, and fuel providing it with heating and air-conditioning, not to mention the commuting costs to get to and from a home in an elite suburb where wide lawns increase travel distances. At least hypothetically, virtual homes might partially solve this problem, not by providing shelter but by providing a cheap way of asserting status.

Figure 1 shows two fancy homes at twilight, in a beautiful suburb with wide green lawns, in the gameworld *Dark Age of Camelot* [18]. They belong to leaders of the Wee Wolves guild, who have built up status and wealth inside this gameworld for more than six years. Four large buildings and many smaller structures such as a stable are surrounded by a beautiful lawn decorated with sculpture and gardens. Both indoors and outdoors, a few non-player servants stand ready to provide resources, including an apprentice merchant who sells crafting raw materials such as cloth and thread, a bane merchant who sells dye and poison supplies, and a vault keeper who manages some of the extensive supplies the guild had amassed. The indoor equipment includes chairs, tables, bookcases, potted plants, blazing fireplaces, and even workbenches and a functioning forge. The guild's symbol, a black trebuchet against a bright sky, appears on wall plaques and numerous banners as seen on the facade of the building on the right. Other interior decorations include tapestries, a painting of Stonehenge, shields, and the heads of dragons. In a crypt, there stands an Albion bindstone, decorated with the image of a lion and the words "Artorus Rex" (King Arthur), that teleports guild members instantly between their property and the city of Camelot, thus obviating the need for commuting via virtual horseback.

Not all gameworlds offer virtual houses. In *World of Warcraft*, there exist many enterable buildings, some of which are wholly or partially unoccupied, but none of them can be purchased by individuals or guilds. At the opposite extreme, my chief avatar in *Lord of the Rings Online* owns her own mansion in one area, and shares a large building at another location as member of a *kinship*, the gameworld's equivalent of a guild. In both *Star Trek Online* and *Pirates of the Caribbean Online*, users own ships rather than houses, and friends are able to visit them. My *Final Fantasy XI* avatar has an apartment in a virtual city named San d'Oria, and he has access to the equivalent of hotel rooms when he visits two other cities in this Japanese virtual world. Needless to say, the existence of these personal environments is precarious, and many people lost their homes when *The Sims Online* shut down in 2008. Others lost property when *Entropia Universe* went through a major geological upheaval in 2009. Frankly, these virtual homes may not be very important to their owners, because there are many other virtual environments where they may socialize, other ways of achieving status, other places to store virtual objects, and a lack of scientific studies demonstrating their psychological significance.

Figure 1. Two Virtual Homes in *Dark Age of Camelot*.

Many MMOs have invested great effort giving users other ways they can assert their social status in public, such as websites that provide much information about the accomplishments of their avatars. The most extensive of these is the Armory for *World of Warcraft*, which posts more than a thousand different pieces of information about each of millions of characters, plus their social relationships as expressed by membership in particular guilds and arena teams (www.wowarmory.com). On July 13, 2010, I looked up Gonzorina, a female Troll huntress who is the avatar of journalist John Bohannon who created the Gonzo Scientist feature for *Science* magazine and inspired the conference I organized in WoW [19]. She has reached experience level 80, the highest currently possible, which takes 400 to 500 hours to achieve, but she has not done much geographic exploring in this virtual world, never having visited a variety of accessible locations from Darkshore to Shadowmoon Valley, let alone more difficult goals for a Troll like Teldrassil or Azuremyst Isle. Among the vast amounts of data available from the Armory about Gonzorina, especially notable are the fifty most recent special events or personal accomplishments, of which the newest was killing 10 Ingvar the Plunderer minions in Utgarde Keep on June 1, 2010. In addition, we can see that she is the leader of the Science guild, which has 252 members at level 10 or above, 50 of whom have reached level 80. In short, we can learn not only many fine details of Gonzorina's life, but also get a sense of her general character: She is not much of an explorer, but exhibits a drive for competitive success in high visibility social contests.

Several other gameworlds accord special honor to top performers. For example, the World War II online game *Battleground Europe* lists the top 100 scorers in each of many specializations, such as a French aviator named Warskar who achieved 107 kills in 160 sorties flying a Curtis Hawk fighter

plane, most recently shooting down two Junkers 87 *stukas*, two Focke-Wulf 190s, and five Messerschmitt 109s—only virtually, of course (csr.wwiionline.com). When a player dies in real life, his friends honor him with a military funeral, often conducted in a virtual cathedral, and memorials for 54 of these fallen comrades can be found across this virtual version of Europe in the year 1940.

Christopher Dawson is the top-rated pirate in the online game based on Disney's *Pirates of the Caribbean* franchise (piratesonline.go.com). Naturally he has achieved "notoriety" of 50, the top formal level of fame in the game, but so have thousands of others. He has also taken all his skills to their top level, in such diverse areas as cutlass wielding, dagger stabbing, and ship sailing, but that requires only a few months of effort. Notably he has collected almost all of the rare artifacts available in the virtual world, including portraits of all nine rogues who lead the pirates' organization, a task assigned him by beautiful Elizabeth Swan, the heroine of all three *Pirates* movies. He owns two ships, a light sloop he uses as a personal yacht, and a powerful war frigate with 14 cannons and room for a crew of 12 players. The only way to obtain a war frigate is to buy one for 80,000 virtual gold coins, which are earned primarily by stealing them from non-player characters, thus representing advanced status as a swashbuckling pirate. Dawson is an officer of the Crazy Rumrunners guild, which was founded April 22, 2008, and currently has 212 members, so he has no trouble getting crew to man his cannons in especially rewarding team missions.

3. Teleconferencing and Telecommuting

It is widely believed that teleconferencing, telecommuting, and telework could be valuable responses to climate change, perhaps even mitigating it to some extent, acknowledging that there may be costs as well as benefits from the use of the necessary technologies [20,21]. However, a survey of 78 US government agencies found that less than nine percent of workers whose jobs made them eligible for telework were in fact doing it even on a limited part-time basis [22], and this is true a decade after the federal government enacted laws to encourage telework. Barriers to implementation of telework technologies include deficiencies in the technology itself, reluctance on the part of employers to invest in it, and lack of skills or enthusiasm among the workers. There are in fact many forms of telework, some involving constant travel in the field rather than work in a fixed location at or near home that might reduce the negative effect of physical commuting [23]. We might think that younger people having more experience with online environments would favor telework, but currently available data do not support this hypothesis [24]. Yet it is plausible that in future years telework could reduce the environmental impact of many jobs in service and information industries, as well as some forms of government work. Virtual worlds allow users to become familiar with a range of tele-activites, as well as gaining facility in using the technology.

Consider the raids my *World of Warcraft* character, Catullus, joined on three enemy cities, Ironforge and Stormwind in one raid, and Darnassus in another. He was a member of one of the very largest guilds, Alea Iacta Est (The Die Is Cast), which is connected to a long-running weekly online podcast "radio program", *The Instance*, and led by people who are extremely comfortable with telework (theinstance.net). It was only after hearing a dozen of the podcast programs that I realized the two men creating it were not in fact in the same radio studio, but were doing the entire high-quality activity online from about a thousand miles apart. A raid in WoW is managed by groupware that

organizes 40 people into 8 teams of 5, typically allowing everybody to hear the voice communications, but only team leaders to speak, and sharing crucial information moment to moment through on-screen displays for members of each small team. In one raid, we were able to battle our way past defenders of Ironforge to the subway train to Stormwind, then seize the Stormwind subway station against the inhabitants of that city. The other raid, which allowed Catullus to infiltrate the Temple of the Moon in Darnassus, required the teams to seize first one ship and then a second one, because that enemy city was on a distant and supposedly inaccessible island. My point is not that these incursions were really heroic, but that they took very concentrated effort by many people, organized well but flexibly, over several hours, entirely online.

One of the most impressive virtual worlds, from the standpoint of online cooperation, is called *A Tale in the Desert* and set in ancient Egypt. Unlike WoW, it does not permit combat between users, and the gamelike elements all involve peacefully solving puzzles, creating elaborate artifacts, and conducting group rituals. Figure 2 shows Ren Hotep, my ancient Egyptian avatar, attending a group activity centered on shooting off firework displays that people had created. Several of the avatars in the picture belong to people completing the Test of Pyrotechnics, which requires: "Learn any star recipe from the university of art and music, make gunpowder, grind aluminum into powder, learn the neutralization tech from a University of Thought, build an acid bath, start a batch of salts, complete 21 salts, build a star rack, make a batch of stars, build a mortar, arm and test-fire a mortar, register as an exhibitor for a legitimate fireworks show, and exhibit your shell at a show" (www.atitd.org/wiki/tale4/Test_of_Pyrotechnics).

Figure 2. A Pyrotechnics Festival in *A Tale in the Desert*.

Consider what is required to make virtual gunpowder in *A Tale in the Desert*, something that the real ancient Egyptians could not actually do. In a chemistry laboratory, they would need to combine charcoal, sulfur, and saltpeter. Charcoal could be made in a firepit, which could be constructed from 80 pieces of slate picked up from a stream bed plus 40 firebricks fired in a kiln (which needed to be made), and which caused pollution if the firepit were set up near water or farmland. Rather complex steps were required to obtain sulfur and saltpeter, but the real challenge was the chemistry laboratory, the construction of which required 50 glass jars, 20 glass rods, 900 boards, 214 nails, 19 pieces of rope, 10 wooden pegs, 5 copper sheeting, 1 wooden pestle, and 1 clay mortar. Facilities like the chemistry laboratory tended to be built by guilds, for use by all members, because they were simply too demanding for any one individual. Similarly, the glass objects, the nails, and the copper sheeting could not easily be provided by one person, and thus cooperation in very complex systems of sharing and mutual aid was required.

Each successful online gameworld has its own user interface, information system, and set of economic rules. Despite having become expert with fifteen of them, it takes me close to a work week to master the techniques required for each new gameworld, but I can usually get around okay after one day's effort. Thus learning in one virtual environment does not automatically transfer to another, but once one has gained familiarity with two or three, one can be confident about mastering the next one. Many of the features of these worlds are similar to those that people of the future will use in doing their work, including remotely in telecommuting. One learns how to handle computerized inventories, text and voice communication systems, group coordination software, interactive maps, and a number of tactical and configuration processes that are equivalent to computer programming but carried out through organizing icons or other non-traditional means. In addition, every gameworld has a wiki, and some have many other elaborate online information resources, from which all users gain and to which many of them contribute, integrating them fully in the online information universe where much future work will be conducted.

4. Globalization across Multiple Worlds

Once upon a time, Maxrohn my second-highest *World of Warcraft* character rode his steed in a cavalry group across the Barrens toward the Orc capital city, Orgrimmar. He was a member of the Alliance, and the city belonged to the opposing faction, the Horde, so the scene depicted warfare between hostile blocs. While their avatars galloped side by side toward Orgrimmar's main gate, the people operating them were situated across the entire United States, plus Canada, and the married couple leading the attack were in fact in London, England. All forms of online communications span national borders, but the gamelike worlds with their distinctive alliances represent the emergence of global communities that may ultimately transcend nationalism. Of course, other institutions have done this in the past, notably religious movements and transnational corporations, but the virtual worlds may hint at how information technology will play into the historical evolution of humanity from tiny hunter-gatherer bands to kingdoms, to nation-states, and perhaps to unification of the globe. Along the way, humanity needs help creating international associations dedicated to protection of the Earth's environment [25].

The May 2008 conference in *World of Warcraft* brought together people living in Australia, Canada, Denmark, Norway, Russia, United Kingdom, and the United States. Their avatars represented five races: Blood Elves, Orcs, Tauren, Trolls and the Undead, all of whom are members of the Horde. Figure 3 shows them dancing after the conclusion of the third and final plenary session of the conference, prior to an attack they launched on the Alliance stronghold in Westfall. Dancing on the wall in the foreground are Catullus and his virtual wife Lunette, who in their marriage try to transcend the virtual nationalisms of WoW, because she is a Night Elf and thus belongs to the enemy bloc, the Alliance, along with Draenei, Dwarves, Gnomes, and Humans. The gameworld is set up so that members of the Horde cannot communicate with members of the Alliance, because they do not have a language in common, and text typed into the chat is converted into gibberish for members of the opposing bloc. Catullus and Lunette were able to communicate, however, but only because I was running them both, using two computers on two WoW accounts, what is technically called *multiboxing*.

Figure 3. Celebrating a Successful Conference in *World of Warcraft*.

World of Warcraft is not only a gameworld but a sophisticated critique of human society, that includes many missions and locales that depict environmental ruin. Blood Elves, like Catullus, experiment with dangerous nuclear energies, while the Undead experiment with biological warfare. One mission requires killing many whales, even as their songs plaintively reverberate in the background. The wetlands of Zangarmarsh are being drained, the forests of Stonetalon Mountains are being chopped down, and extensive Plaguelands have been rendered uninhabitable by plague weapons. Players of WoW may reflect upon these tragedies, but the gameworld suggests there ultimately is nothing that can be done about them, because incessant warfare and environmental degradation are the

inescapable results of too many people competing for too few resources. A comparable gameworld, *Lord of the Rings Online*, describes a very similar situation, but argues that it is possible for all people of good will to unite against evil to preserve nature [26,27]. The fact that both gameworlds have international audiences enhances their ability to become arenas for discussion of global issues in the real world.

In the Swedish virtual world, *Entropia Universe*, I have observed use of twelve different languages, although English is most common. *Anarchy Online* and *Age of Conan* were created by a Norwegian company, and *EVE Online* comes from Iceland, so Scandinavians are well represented in the virtual universe. *Lineage II* is a Korean gameworld, as is *Silkroad Online*. I have seen a Brazilian in *Second Life* type a sentence in Portuguese, followed immediately by an English version produced by an automatic translation system, followed by the user's editing of the English sentence. Thus people are beginning to use the technology to reach beyond their native languages. Very popular gameworlds, such as *World of Warcraft*, tend to localize the servers in order to give fastest Internet response, which has the effect of isolating different geographic areas and languages from each other, whereas less popular gameworlds may cover wider physical and cultural territories. As a universe, however, they span across the most developed nations and are beginning to move into developing nations, thus linking people across traditional boundaries.

Japan is well known for its videogames, Nintendo and Sony Playstation being two of the three main hardware manufacturers. Yet the only internationally popular Japanese MMO is *Final Fantasy XI* (FFXI), as the name suggests the eleventh in a series of related games, soon to be superseded online by *Final Fantasy XIV*. The very name is a transliteration of the English words into Japanese: ファイナル ファンタジ or *Fainaru Fantajī*, and the intention of the creators was always to produce games for an international audience, especially players in the United States. *Final Fantasy XI* runs on multiple hardware systems, allowing people to interact regardless of whether their machines were Windows personal computers, the Play Station 2, or the Xbox 360. When I first entered this gameworld, using a Windows-based personal computer, the first user I interacted with extensively was using an Xbox.

FFXI's use of multiple platforms is nearly unique, yet suggests what the future ubiquitous information technology will be like. Already, people play social games on mobile devices, and games link FaceBook pages and other social computing sites. An especially promising future genre is *pervasive LARPs*—live-action role-playing games conducted partly on Internet and partly in the physical environment [28,29]. I like to imagine the significance of hypothetical future pervasive LARPs that use gaming methods to confer status on players who accomplish political missions. *Carnage* is an imaginary game in which people scour the suburbs for gas-guzzling cars, photograph them with mobile devices, and display online a picture with the name and address of the owner, earning a certain number of game points for an SUV, a Cadillac, or a bloated minivan, and thereby shaming the owners of such wasteful vehicles. Other environmental pervasive LARPS could attach sensors to mobile computers, earning game points for measuring the air and water quality in specified real-world locations, including places where particular corporations are responsible for pollution. In other words, bringing online gaming into the real world can transform the enemies of the Earth into enemies of the players, and careful design can achieve political goals without violating the legal rights of the targets.

Games are all about hostility contained within acceptable boundaries, and combating pollution means combating some people. The mirror image of hostility is comradeship, and especially when the enemy is a transnational corporation, the team of heroes must also be transnational. Significantly, FFXI has a built-in phrase dictionary, intended to allow people who do not speak the same language to team up. Four languages are supported: Japanese, English French, and German. On a computer, pressing the [Tab] key brings up a menu of categories, and going into one opens a menu of phrases. Examples relevant to this discussion follow, two each from some of the more interesting categories:

> Greetings: "Nice to meet you." "Please forgive me."
> Questions: "Do you need any help?" "What's the battle plan?"
> Answer: "I don't understand." "I'm sorry. I'm busy now."
> Tactics: "Defeat this one first!" "Let's rest for a while."
> Location: "Over there." "This way."
> Groups: "Allegiance." "Alliance."
> Jobs: "Samurai." "Thief."
> Time: "Tomorrow." "Wednesday."
> Trade: "Lower the price?" "You can have this."
> Organize: "Create an alliance?" "Please let me join."
> Place Names: "The Celestial Nexus." "Northern San d'Oria."
> Reasons: "I want to make money." "Have stuff to do, gotta go!"
> Languages: "Can you speak English?" "I don't speak any Japanese."
> Shops: "Auction House." "Air Travel Agency."
> Songs: "Madrigal." "Virelai."
> Equipment: "Hachimaki." "Shinobi-gatana."
> General Terms: "Fantasy." "Sightseeing."
> Job Abilities: "Berserk." "Meikyo Shisui."
> Job Traits: "Martial Arts." "Treasure Hunter."
> Weapon Skills: "Guillotine." "Vorpal Blade."
> Ninjutsu: "Utsusemi." "Hojo."
> Avatars: "Leviathan." "Shiva."

An English-speaking user can select one of these phrases, and then a Japanese-speaking user will see the Japanese equivalent in the game's text-based chat. A reply selected from a Japanese list will appear to the first user in English. Some of the terms have been culled from major world cultures, here including *virelai* and *guillotine* from French, *madrigal* from English, *berserk* from Scandinavian, and both *avatar* and *Shiva* from Hindu traditions. *Vorpal* is Jabberwocky from *Through the Looking-Glass*, an English work of literature.

Some of the terms in the English side of the dictionary are actually Japanese words of which only *samurai* is familiar to English-speakers. *Hachimaki* refers to the bandanna that traditionally a Japanese warrior would tie across his brow to express commitment to a dangerous mission, and *shinobi-gatana* is a particular kind of ninja sword. *Meikyo shisui* is a mental state that might be attained through meditation, in which the mind becomes like a shining mirror or quiet waters. *Ninjutsu* is a general term for strategy and tactics of unconventional warfare, although listed among magic spells on the user

interface, and this category of the phrasebook lists a dozen Japanese words without explanation. *Utsusemi*, or locust shell, is the title of a chapter in the *Tale of Genji*, which I associate both with Buddhist detachment and a feeling of rejection, whereas *hojo* probably refers to a basic principle of martial arts on which more complex styles may be built.

Thus, gameworlds, like many other Internet-based social technologies, have the potential to bridge between cultures and develop globe-spanning organizations. This is true for the wider milieu in which these worlds are embedded, as well. For example, the online information resources for several of them are multilingual. The community forums of *Battleground Europe* are in English, German, French, Spanish, and "Skandinavisk," while *Dark Age of Camelot* operated in English, French and German. An important example of transnational creativity is the *modding* community that creates special *add-on* software that operates inside *World of Warcraft*, active now in China as well as the United States [30]. However, these diffuse communities are not hierarchically structured or indeed well-organized according to any clear principle. Beyond the exchange of information for status, they do not constitute the well-developed communities of economic interest that might be required to create non-spatial governments, coherent socio-political structures that endure over time and support shared values without being limited to any particular geographic area [31].

5. Societal Problems

It would be naive to think that any one technology could solve humanity's problems, and the positive contributions of virtual worlds could be much greater if coupled with compatible social and economic changes. Another less optimistic way of expressing this is to say that some very vexing problems are faced by humanity, and even a very benign new technology could have disastrous effects if its unintended consequences were handled poorly. In particular, conspicuous consumption maximizes economic activity, and without it the unemployment rate could increase significantly.

For decades, social scientists have debated whether new technologies increase unemployment, or whether new jobs balance off the losses caused by the "creative destruction" of capitalist innovation [32]. Traditionally, the answer has depended upon whether one looks at net employment for the society as a whole, or at the life situations of the people who lose jobs, and both must be understood in the context of the prevalent social institutions [33]. More recently, a concern has arisen that the "knowledge economy" requires facility with information technologies, and thus older people and those with (for whatever reason) limited technical abilities will become unemployable [34]. To put the point crudely: If your mansion exists in a virtual world, you won't need to hire anybody to cut the grass.

The usual starting point for a discussion of these matters is the work of John Maynard Keynes [35]. Objectively, his work was a great contribution to economics, but unfortunately he is widely remembered as a critic of the capitalist system and thus often rejected on ideological grounds. However, the fundamental questions he raised must be answered if capitalism is to survive, as well as if it is to be replaced by something else. Consider the lawn tending service that will go out of business when you no longer need someone to cut the grass. The employees who work in its office may be able to get new jobs, but what about the manual laborers, especially if many comparable occupations are becoming technologically obsolete at the same time? As Keynes described it, the classical theory of

economics holds that there will always be enough jobs in a free economy, but workers may need to take pay cuts to get one. An employer will tend to offer wages that match the value the employer receives from the work, so as the labor value of a class of workers declines, so do their wages, but they will always be willing to accept work under mutually beneficial terms.

One flaw in this logic, and Keynes suggested there were many flaws, is that the value of a laborer's work may decline to the point that the worker cannot obtain "a living wage." At the extreme, the worker may lack the money to pay the costs of commuting between home and work, not be able to support the cost of children, or even starve to death. Sometimes a concept of "welfare threshold" is suggested, an economic level somewhat above starvation but considered by the society to be the minimum acceptable standard of living. Often the government has set a minimum wage, below which employers cannot hire workers, or mandated health and other benefits that employers find too expensive to pay for. Thus, both during temporary hard times like the Great Depression in which Keynes wrote, and if many laboring jobs are eliminated permanently, a large fraction of the population will be unemployable.

Consider some of the industries that would suffer if we shifted much current activity into virtual environments. Hotels and convention centers that depend upon business and government travelers would decline—and this shift could be so precipitous as to be a collapse if leaders suddenly decided to shift to teleconferencing. Activity would plummet for the airlines, taxicabs, and restaurants that serve the hotels. In many nations, any move away from conspicuous consumption in housing could end new construction, although some work would shift to modifying very large homes to turn them into multi-family dwellings. It is hard to guess how other industries associated with status displays would fare, but among them are: clothing, jewelry, fancy automobiles, professional sports, and by analogy with sports some significant fraction of the military. A decline in manufacturing industries naturally causes a decline in transportation industries and in those producing raw materials.

An especially knotty tangle of issues concerns local telecommuting. One form of telecommuting involves high-level knowledge workers who do part of their work at home, functioning as professionals who supposedly require minimal supervision. Ironically, this may not reduce the total resource costs of their commuting, because many of them are able to use part-time telecommuting to live long distances from their employers, thus requiring plane flights or other costly travel frequently. Another form of telecommuting involves ordinary office workers, but this has run into serious issues of organization and supervision.

Consider Washington DC, where many government agencies have been moved into a ring around the city, but previously they were clustered downtown. The city has a good subway system, but one designed for travel into the center of the city not around it, and many working class people are now forced to undergo very long commutes. One reason is that no low-cost housing exists near many of the agencies, but another is that a family with multiple wage-earners cannot expect their various workplaces to be in the same area. Whether justly or not, management believes that working class people need close supervision, so they cannot be allowed to work at home. In the late-1990s there was much talk about setting up unified federal support offices throughout working-class residential areas of the city, where employees of several agencies could labor under proper supervision near their homes, but this innovation has not been implemented. One reason, frankly, is that the benefits would go almost entirely to the workers, at some continuing cost to leadership, and it was politically impossible

to justify the short-term costs of setting up the local telecommute centers. In the current toxic political environment, it is hard to imagine any problems getting solved properly, yet conceivably government leaders could agree to rationalize the regulations and thus the office work of most employees, thereby reducing the number of employees needed, and invest the savings in giving the remaining employees better near-home working conditions.

Indeed, it is hard to think of any major reforms that would not have the effect of harming some people to the benefit of others, short of a peaceful revolution based on humane and scientific principles. For example, I have long wondered whether traditional notions of intellectual property rights make any sense in the modern information society. Research on the actual implications of the patent system for inventions gives ambiguous results, and little research has been done on the actual effect of copyright for music and literature. It is possible, for example, that ending copyright for music would kill the industries that currently distribute much bad music, reduce the significance of celebrity performers that cater to base human fascination with perversion, save vast amounts of energy by ending mass-market rock concerts, and enhance the economic visibility of careers of a diversity of musicians in their local communities [36]. Perhaps I am wrong that more people would listen to the works of Johann Sebastian Bach, but perhaps they would if recordings of all his works were freely available.

A utopian movement of the 1930s called Technocracy Incorporated suggested junking the traditional system of money in favor of energy certificates, with the stipulation that every citizen would receive an equal stipend representing his or her share of the national productivity [37]. Most gameworlds have internal currencies, typically virtual coins in the medieval-style examples, but information units in *The Matrix Online*. These internal currencies are usually not convertible into external currencies [38], and each avatar has an equal chance to earn them, unlike the situation in the outside world, where accidents of birth have huge economic consequences. Economist Edward Castronova [39] has suggested that experience in these gameworlds might encourage people to expect full equality of opportunity in the external world, thus promoting social change. However, many of the gameworlds have recently moved to dual currencies. In *Dungeons and Dragons Online*, for example, virtual *coins* are earned by completing missions and looting enemies, but *points* can be bought for dollars both inside and outside the gameworld, then spent to provide great advantages for the avatar, such as hiring non-player character artificial intelligence mercenaries to fight at one's side. Without adopting Technocracy's radical socialism, one can imagine modest changes in the current system of currency, finance, and taxation that encouraged a significant fraction of status competition to move away from the traditional economy.

Then, many virtual worlds would naturally arise, some similar to games like *World of Warcraft* and others organized around sharing of music and other cultural products, or anything else that can be conveyed as information. Inequality would quickly arise inside the virtual environments, producing a high-status elite within each, but at very low cost in the material world. They could vary in terms of whether their internal currencies were convertible, but given that people started with equal amounts of real-world money, many of them would follow the example of *World of Warcraft* and remain non-convertible. Importantly, each person could decide which virtual world to inhabit, so everybody would be able to gain social status in environments they find satisfying. The result would be a system of dual currencies, one system denominated in dollars reducing inequality in the physical world to support everybody just above the welfare threshold, and many highly stratified markets based on

virtual money reflecting social status in separate systems of honor that did not burden the Earth's natural environment with their purely informatic conspicuous consumption.

However, a word of warning is in order. Virtual worlds could encourage people to abandon efforts in the physical world to preserve wilderness areas and biodiversity. Many regions of the gameworlds depict virtual wilderness areas filled with wildlife, some of it realistic and some of it fanciful. The typical manner of interaction is for the wildlife to attack the player's avatar, and for the avatar to shoot the wildlife. Quite apart from the hunter mentality this may instill in players, it prepares them to believe that virtual wilderness is a good substitute for real wilderness, which may reduce the value of conservation in their minds. In addition, by conceptualizing wild animals as packets of information, they may be prepared for the idea that biodiversity can be preserved merely by sequencing the DNA of wild animals and documenting their natural behavior, but not worrying about whether they become extinct afterward.

Then an argument can be made that the nasty lions need to be eradicated from Africa, and the vicious tigers from India, so that the poor people of those places will have the maximum territory in which to become prosperous, rather than being forced to share them with animals like lions and tigers who have always been their enemies. There are lions in *World of Warcraft*, and tigers in *Final Fantasy XI*, if one wants to experience an encounter with a large feline carnivore. This logic has no obvious stopping point. One may see zebras in *World of Warcraft*, and giraffes in *Final Fantasy XI*, although both are rather different from the ones in Africa. With the passage of centuries, it is hard to see what will prevent the entire world from becoming like an English back garden, in which every living thing serves the humans in the house, and nothing is really wild. Clearly there is much to debate along this line of thinking, and we do not have the benefit of social science research that could evaluate any of the hypotheses. But it seems likely that extensive experience in gamelike virtual worlds would prepare people to reconceptualize conservation in terms of information, and facilitate a radical reduction of the scope of environmentalism, to merely ensuring clean air and water for human use, and letting much of wild nature die after it have been digitally documented.

One lesson many people drew from the twentieth century is that utopias are dangerous, and long before that most people had decided that utopias were frivolous impossibilities. Considering gameworlds as utopias seems like frivolity squared, but as any student of algebra knows, a negative times a negative is a positive. One does not need to be a congenital pessimist to doubt that minor changes can save our dying civilization. With that in mind, gamelike virtual worlds may be useful experimental laboratories for possible radical transformations of real society in the future. They may even serve as effective training grounds for the citizens of the future, and offer a bridge to that future over which many people may begin to cross, even today.

Acknowledgements

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