

# Economics fallacies of future technology

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The potential impact of future technologies seems so significant that it is easy to jump to incorrect conclusions about what things would be like with their advent. This article discusses some common fallacies made when thinking about the economics of technology development, technology adoption and market evolution.

Technology Development Fallacies	Technology Adoption Fallacies	Market Evolution Fallacies
Universal access: newtech should not be developed unless it can be universally accessible	Technology rollout: newtech like molecular assemblers will rollout worldwide overnight	Singularity: the singularity is a great investment opportunity
Dual use: newtech should not be developed because it has potentially detrimental uses	No killer app: lack of immediate benefits impedes technology adoption	Social capital: social capital markets need not deliver competitive returns
New business models: economic systems become irrelevant in the future	Upload equality: uploaded human minds will have equal resources	Prediction markets accuracy: prediction markets are good at predicting outcomes

## *Technology Development Fallacies*

### **Fallacy #1: Newtech should not be developed if it is not cheap enough for universal access**

This is the view that any beneficial newtech should not be developed unless it can be immediately accessible worldwide at a low price. “Folks, let’s not make the [Eniac](#) since not everyone can have one.” However noble this view may be, it ignores the historical precedent of technology development, rollout and penetration. A fundamental property of technology is that it may be extremely expensive at the outset but if it is successful, then there are price drops, functionality improvements and re-purposing to new markets over time. For example, those currently paying \$100,000 or more per year for life extension treatments are hopefully helping to rationalize, standardize and develop a broader market for these services.

There can still be open-source and universally accessible models, and diligence applied to clearing tiers of public goods to non-IP protected regimes (e.g.; the human genome), but the understanding should be that traditional means of technology development (capitalist IP exploitation and cost drops over time, for example) will continue to be big drivers of progress. There are also many reasons not to adopt newtech immediately; costs are higher, unintended consequences are unknown, early adopters can work out the kinks (e.g.; the first generation iPhone cost \$600, the second generation iPhone 3G with dramatically expanded functionality emerged a year later at \$199) and older technology generations like landline telephony can be skipped. World-is-flat cycle time speed-ups and new business models (for example [OneWorldHealth](#) as a non-profit pharmaceutical company tackling disease in the developing world) are making a wider range of paradigms for technology development and implementation possible. Universal access is a worthwhile goal; the fallacy is in thinking that no newtech will be developed without it.

**Fallacy #2: Newtech should not be developed because it has potentially detrimental uses**

This is the classic dual use argument, the Ray Kurzweil vs. Bill Joy frame that any newtech can be used for both good and evil purposes. Technophobes seek to control and if necessary, extinguish or prevent the development of technology. Technophiles are optimistic about the positive uses outweighing the negative and may also think deterministically that technology development is inevitable as scientific truths are discovered. In some cases, the dual use conflict can be managed by the self-policing of technology developers, for example, the [1975 Asilomar guidelines on recombinant DNA](#) have been followed. However, self-policing is not always feasible as the level of external interest (as from governments) varies and development capability is increasingly widespread (e.g.; consider the difficulty of monitoring basement synthetic biology kits vs. uranium enrichment).

The answer is to be smart about developing newtech, being cognizant of potential negative uses and incorporating detection, prevention and antidote mechanisms where possible. As newtech is developed and implemented, there is a process of societal maturation around the technology; for example, electricity was perceived to be dangerous at the outset. Market economies ensure the demand for responsible technology with safeguards against detrimental uses. The beneficent and nefarious applications of newtech often evolve in lock-step, maybe with a lag but in close succession. Just as biowarfare is certainly under development, so should biosensor development. For example, biotoxin detection could be in the form of wearable sensors or cell phone components and as a feature of in-home air purifiers.

**Fallacy #3: Economic systems become irrelevant in a post-scarcity economy**

This is the notion that economies and markets go away in the future, particularly in a [post-scarcity economy](#) for material goods. At present, an increasing number of goods and services are becoming available for [free](#) or offered via modern business models such as the [freemium](#). In the future, substantially all material needs may be easily met at low cost or for free in a molecular-nanotech society, but scarcity as an economic dynamic is likely to persist and economics systems in general are also likely to continue.

Scarcity would be perceived in whatever material resources were not yet plentifully available and in any finite resources such as time, ideas, attention, emotion, reputation, quality, etc. Economic system dynamics could change substantially but would likely still be present, for example, property tax would not make sense in a world where nanotech could rapidly build or absorb structures. Unless economics and markets as the most effective means of price discovery, value attribution and resource exchange and distribution were superseded, they would be likely to endure.

***Technology Adoption Fallacies*****Fallacy #1: Newtech like molecular assemblers will have a worldwide overnight rollout**

The conventional assumption is that once humans are able to make one [molecular assembler](#), it will be able to self-replicate, and therefore within twenty-four hours everyone worldwide will have one. However, it is unlikely that the first molecular assemblers will be able to self-replicate since intricate molecular manufacturing processes at special facilities will be needed to build them and not all the required metal elements are readily available at one's home.

It is far more likely that the molecular assembler would follow the usual s-curve adoption pattern of any newtech. Early versions are expensive and clunky with minimal functionality and continued improvement iterations make the newtech more relevant, demanded and usable by a larger number of consumers. The first molecular assemblers may be a next generation [3D printer](#), being able to, for example, print the T-shirt or lunch item a friend sends as an email attachment. Only early adopters will have the utility (read: money and interest) to purchase the first molecular assemblers.

In addition, the full newtech delivery ecosystem must be considered. While carbon and other basic elements could be obtained easily from dirt piles delivered to suburban driveways, industrial utility solutions are needed for the 50+% of the urbanized world (imagine molecular compilers loose in NYC).

Cartridge supply for specialty elements (like Gillette) will be required. Matter decompiling will need to be a feature of the molecular assembler or there will need to be some other recycling mechanism.

### **Fallacy #2: Lack of immediate killer apps prevents eventual technology adoption**

Seen from any moment in time, there is often an underestimation of the utility and rate of technology adoption. At the outset, the costs tend to be more tangible whereas the benefits are unclear and will be more fully developed through iterations of the newtech in deployment. Each individual or organization deciding whether to adopt a new technology must see value, a killer app for themselves, for uptake to ensue. Technologies are generally not a surprise, they are seen as coming (e.g.; the \$100 genome and personalized medicine are current examples), and even once they have arrived (e.g.; the Internet, the iPod, virtual worlds), they do not have widespread adoption until diverse groups of users see value and incorporate the newtech into their lives.

The tipping point moment of benefit exceeding cost is the moment of adoption. There are many examples. People give up private personal information for coupons. People allow their credit reports to be posted publicly on the Internet to obtain peer-to-peer loans from websites like [Prosper](#). Most people in the U.S. do not mind having a Social Security Number (oldtech) registered with the government. Many people in the U.S. currently have some conflict about the idea of biometrics (newtech); that their fingerprints, iris scan, facial scan, DNA or other biologically unique information would be on file with the government. Biometrics is an example of newtech that has not yet been positioned in the language of its benefits or killer apps. When a benefit is perceived, adoption quickly follows. The fallacy is in thinking that because a current killer app does not exist that a newtech will never be adopted.

### **Fallacy #3: Upload equality**

There are at least two scenarios for how the mass uploading of human minds could occur, the capitalist model and the socialist model. In the capitalist model, those uploading would choose from a selection of storage, processing and security packages. As in all sales, offerings would be presented with marketing aplomb and feature different levels of service like the Gandhi (minimalist), the Toyota (fully functional) and the Cadillac (premium). The capitalist model is a Darwinist or evolutionary approach. In the developmental socialist model, all storage, processing and security upload packages would be the same, perhaps directed by some sort of governmental or private advocacy body. Each uploading party would receive identical resource modules.

The capitalist model seems most likely; it is the logical extension of how economics and marketplaces function in the current world. Trying to equalize uploads such as by limiting resources at the outset or using a handicapping system, together with periodic recalibrations, is both unlikely to occur, and more importantly, unlikely to make a difference. It is assumed that hyper or at least advanced evolution will occur in the digital substrate which makes the starting point irrelevant, both in terms of capability and processing power. The real question is what resources will **become** available to digital intelligences post-upload or post-creation and the resulting evolution and goal editing which may be at odds with any remaining biological humanity. It is not reasonable to assume that external control could be imposed for long.

## ***Market Evolution Fallacies***

### **Fallacy #1: The singularity is a great investment opportunity**

A technological *revolution* like that brought about by the PC or the Internet is a great investment opportunity. Current possibilities for this kind of compound growth in technology-driven financial returns include alternative energy, genomics, personalized medicine, reduced intervention remedies such as [radio surgery](#) and [robotic surgery](#), [anti-aging therapies](#), 3D data manipulation tools and narrowly-applied artificial intelligence.

A technological *singularity* is not necessarily a great investment opportunity. A [technological singularity](#) implies change so radical and diffuse that prior models for understanding and exploiting or profiting from the world will no longer work. There is a substantial risk that financial markets as they are known could disappear, even without a technological singularity. Growth, [alpha](#) and superior financial returns may be irrelevant in a post-traditional financial markets era. Planning for the possibility of a technological singularity suggests a much broader definition of what the assets of the future may be and allocating to these areas. This is a substantial shift away from the traditional ‘asset preservation and financial returns that outpace inflation in the long-run’ mindset of today.

#### **Fallacy #2: Social capital markets need not deliver competitive returns**

The conventional notion is that it is acceptable for social capital market investments to deliver lower returns than traditional financial instruments. Social capital market investment products include [SRI](#) equity funds, corporate governance initiatives, social capital venturing (private equity), and attribute products such as fair trade coffee and organic produce. On average, consumers have been willing to spend 5% more for affinity attribute products and investors have been willing to sacrifice 5% or more in financial returns for socially responsible investments.

However, after some implementation time lag, social capital could have equal or higher returns. Sustainable socially responsible businesses should be more profitable not less. Direct tangible economic benefits can accrue as well as the indirect benefits of marketing and market-knowledge that the business is more principled and sustainable. Corporate governance and other green or social initiatives should benefit the bottom line, not penalize it. The notion that return and social good are mutually exclusive is a fallacy.

#### **Fallacy #3: Prediction markets are good at predicting outcomes**

The conventional wisdom is that prediction markets are accurate at predicting outcomes; however they are better barometers of current sentiment than they are predictors of final results. For example, [InTrade](#) has large and liquid markets in events regarding this year’s U.S. presidential election. The markets continually shifted to show Clinton as an initial favorite for the democratic nomination then gradually moved over time to reflect Obama as the final nominee. The prediction market for Obama’s likelihood of winning the election moved from 70% to 60% in August 2008, then narrowed to 50% and widened back to 65% in the wake of the U.S. financial crisis in September 2008. Instead of predicting the final outcome, the prediction markets will likely continue to register the current sentiment at any moment about the election, shifting as November 2008 approaches.

At any moment prediction markets reflect the current sentiment of the final outcome, not the final outcome at the moment at which it will occur. The same is true of financial market instruments such as oil futures; the fallacy is the claim that prediction markets are accurate predictors of final outcomes substantially ahead of the events. Prediction markets have value as sentiment barometers, as discoverers of previously hidden information, and as possibly being closer to predicting accurate final outcomes than other tools except for a handful of experts who are not consistent predictors across events, but not as accurate pre-event outcome predictors.

