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SAFE UTILIZATION OF ADVANCED NANOGTECHNOLOGY

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Abstract

Many words have been written about the dangers of advanced nanotechnology. Most of the threatening scenarios involve tiny manufacturing systems that run amok, or are used to create destructive products. A manufacturing infrastructure built around a centrally controlled, relatively large, self-contained manufacturing system would avoid these problems. A controlled nanofactory would pose no inherent danger, and it could be deployed and used widely. Cheap, clean, convenient, on-site manufacturing would be possible without the risks associated with uncontrolled nanotech fabrication or excessive regulation. In addition, restricted design software could allow unrestricted innovation while limiting the capabilities of the final products. The proposed solution appears to preserve the benefits of advanced nanotechnology while minimizing the most serious risks.

***Index Terms** : Nanotechnology, infrastructure, Utilization*

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1. WHAT IS NANOTECHNOLOGY AND HOW IT GOT START

Nanotechnology is science, engineering and technology conducted at the nanoscale which is about 1 to 100 nanometers. Physicist Richard Feynman the father of nanotechnology Nanosicience and nanotechnology are the study and application of extremely small things and can be used across all the other science fields. Such as chemistry biology. Physics. Materials science.

The ideas and concepts behind nanoscience and nanotechnology started with a talk entitled . There's plenty o room at the bathroom 'by physicist Richard Feynman at an American Physical Society meeting at the California Institute of Technology (Call/Tech) on December 29, 1959 long before the term nanotechnology was used in this talk. Feynman described a process in which scientist would be able to manipulate and control individual alone and molecules. Over a decide later in his exploration of ultra-precision matching. Professor Nano Taniguchi coined the term nanotechnology. It wasn't until 1981 with the development of scanning funnelling microscope that could see individual atoms. That modern nanotechnology begins.

Advanced Nanotechnology And Its Risks

As early as 1959, Richard Feynman proposed building devices with each atom precisely placed1. In 1986, Eric Drexler published an influential book, Engines of Creation2, in which he described some of the benefits and risks of such a capability. If molecules and devices can be manufactured by joining individual atoms under computer control, it will be possible to build structures out of diamond, 100 times as strong as steel; to build computers smaller than a bacterium; and to build assemblers and mini-factories of various sizes, capable of making complex products and even of duplicating themselves.

Drexler's subsequent book, Nanosystems3, substantiated these remarkable claims, and added still more. Molecular manufacturing operations could be carried out with failure rates less than one in a quadrillion. A computer would require a miniscule fraction of a watt and one trillion of them could fit into a cubic centimeter. Nanotechnology-built fractal plumbing would be able to cool the resulting 10,000 watts of waste heat. It seems clear that if advanced nanotechnology is ever developed, its products will be incredibly powerful.

The enormous investment in nanotechnology. Will take a number of nanoparticles that are currently explored in labs to mass market. Naoparticies will become more abundant in work environments. Consumer product and the environment.

Sufficiently powerful products would allow malevolent people, either hostile governments or angry individuals, to wreak havoc. Destructive nanomachines could do immense damage to unprotected people and objects. If the wrong people gained the ability to manufacture any desired product, they could rule the world, or cause massive destruction in the attempt9.

2. NANOTECH MANUFACTURING AND ITS PRODUCTS

The technology at the heart of this dilemma is molecular manufacturing. A machine capable of molecular manufacturing—whether nanoscaleor macroscale—has two possible functions: to create more manufacturing capacity by duplicating itself, and to manufacture products. Most products created by molecular manufacturing will not possess any capacity for self-duplication, or indeed for manufacturing of any kind; as a result, each product can be evaluated on its own merits, without worrying about special risks. A nanotechnology-based manufacturing system, on the other hand, could build weapons, grey goo, or anything else it was programmed to produce. The solution, then, is to regulate nanofactories; products are far less dangerous. A nanotechnology-built car could no more turn into grey goo than a steel-and-plastic car could.

Any widespread use of nanotechnology manufacturing must include the ability to restrict, somehow, the range of products that can be produced.

If it can be done safely, widespread use of molecular manufacturing looks like a very good idea for the following reasons:

a. The ability to produce duplicate manufacturing systems means that manufacturing capacity could be doubled almost for free.
b. A single, self-contained, clean-running personal nano factory could produce a vast range of strong, efficient, carbon-based products as they are needed.
c. Emergency and humanitarian aid could be supplied quickly and cheaply.
d. Many of the environmental pressures caused by our current technology base could be mitigated or removed entirely.
e. The rapid and flexible manufacturing cycle will allow many innovations to be developed rapidly

Although a complete survey and explanation of the potential benefits of nanotechnology is beyond the scope of this paper, it seems clear that the technology has a lot to offer.

Development of nanotechnology must be undertaken with care to avoid accidents; once a nanotechnology-based manufacturing technology is created, it must be administered with even more care. Irresponsible use of molecular manufacturing could lead to black markets, unstable arms races ending in immense destruction, and possibly a release of grey goo. Misuse of the technology by inhumane governments, terrorists, criminals, and irresponsible users could produce even worse problems—grey goo is a feeble weapon compared to what could be designed. It seems likely that research leading to advanced nanotechnology will have to be carefully monitored and controlled.

However, the same is not true of product research and development. The developer of nanotechnology-built products does not need technical expertise in nanotechnology. Once a manufacturing system is developed, product designers can use it to build anything from cars to computers, simply by reusing low-level designs that have previously been developed. A designer may safely be allowed to play with pieces 1,000 atoms on a side (one billion atoms in volume). This is several times smaller than a bacterium and 10,000,000 times smaller than a car.

Working with modular "building blocks" of this size would allow almost anything to be designed and built, but the blocks would be too big to do the kind of molecular manipulation that is necessary for nano-manufacturing or to participate in biochemical reactions. A single block could contain a tiny motor or a computer, allowing products to be powered and responsive. As long as no block contained machinery to do mechanochemistry, the designer could not create a new kind of nanofactory.

3. USING NANOTECHNOLOGY SAFELY

A safe personal nanofactory design must build approved products, while refusing to build unapproved products. It must also be extremely tamper-resistant; if anyone found a way to build unapproved products, they could make an unrestricted, unsafe nanofactory, and distribute copies of it. The product approval process must also be carefully designed, to maximize the benefits of the technology while minimizing the risk of misuse. Restricted nanofactories avoid the extreme risk/benefit trade off of other nanotechnology administration plans, but they do require competent administration. One way to secure a personal nanofactory is to build in only a limited number of safe designs.

A more useful and secure scheme would be to connect the PN to a central controller, and require it to ask for permission each time it was asked to manufacture something.

Only designs from the library could be manufactured. In addition, each design could come with a set of restrictions. For example, medical tools might only be manufactured at the request of a doctor. Commercial designs could require payment from a user.

4. PRODUCT DESIGN PARAMETERS

Rapid innovation is a key benefit of nanotechnology. The rapid and flexible manufacturing process allows a design to be built and tested almost immediately. Because designers of nano-built products do not have to do any actual nanotechnology research, a high level of innovation can be accommodated without giving designers any access to dangerous kinds of products. As mentioned above, a design with billion-atom, sub-micron blocks—permitting specification of near-biological levels of complexity—would still pose no risk of illicit self-replication. The minimum building block size in a design could be restricted by the design system. A fully automated evaluation and approval process could also consider the energy and power contained in the design, its mechanical integrity, and the amount of computer power built in. The block-based design system provides a simple interface to the block-based convergent assembly system. A variety of design systems could be implemented using the same nanofactory hardware, and the designer would not have to become an expert on the process of construction to create buildable designs.

Risks and dangers associated with products could be assessed on a per-product basis. Many products, produced with simplified design kits, could be approved with only automated analysis of their design. Most others could be approved after a safety and efficacy assessment similar to today's approval processes. Only rarely would a new degree of nanotechnological functionality be required, so each case could be carefully assessed before the functionality was added to appropriately restricted design programs.

Product approval for worldwide availability could depend on any of several factors. First, unless designed with a child-safe design program, it could be evaluated for engineering safety. Second, if the design incorporated intellectual property, the owner of the property could specify licensing terms. Third, local jurisdictional restrictions could be imposed, tagging the file according to where it could and could not be manufactured. Finally, the design would be placed in the global catalog, available for anyone to use.

5. CONCLUSION

Nanotechnology offers the ability to build large numbers of products that are incredibly powerful by today's standards. This possibility creates both opportunity and risk. The problem of minimizing the risk is not simple; excessive restriction creates black markets, which in this context implies unrestricted nanofabrication. Selecting the proper level of restriction is likely to pose a difficult challenge.

This paper describes a system that allows the risk to be dealt with on two separate fronts: control of the molecular manufacturing capacity, and control of the products. Such a system has many advantages. A well-controlled manufacturing system can be widely deployed, allowing distributed, cheap, high-volume manufacturing of useful products and even a degree of distributed innovation. The range of possible nanotechnology-built products is almost infinite. Even if allowable products were restricted to a small subset of possible designs, it would still allow an explosion of creativity and functionality.

This paper has outlined a scenario for the safe development and use of advanced nanotechnological manufacturing. Unrestricted molecular manufacturing creates several high-stakes risks. The use of a restricted nanofactory design that is safe for widespread deployment can mitigate some of these risks, and other risks can be dealt with piecemeal by making many low-stakes decisions about the factory's products. Careful attention must be paid to security during the initial nanofactory development, and wise administration must be implemented to prevent both undesired products and pressure for black markets or independent development. With these caveats, however, the system presented here preserves almost all the benefits of unrestricted nanotechnology while greatly reducing the associated risks.

REFERENCE

[1] What is nanotechnology and how it got a start http://www.nano.gov/nanotech...../

[2] “There’s plenty of room at Bottom” in the title of a famous speech given by Richard P Feynman on Dec 29,1959 Htttp://www.zyvex.com/nanotech/feyman.html

[3] K.Eric Drexler. Engines of creation. Anchor press. 1986

[4] Nanotechnology The potential for new WMD http://www.janes.com/security/international security/news/jcbw/jcbw03115/n.html

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