Public Invention

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Public Invention, a US public charity

If you want to build a ship, don't drum up the men to gather wood, divide the work, and give orders. Instead, teach them to yearn for the vast and endless sea.

– Antoine de Saint-Exupéry

Preface

This is a draft work whose purpose is explain and promote Public Invention as a movement and philosophy. My hope is to create a coherent and convincing work. This work will likely be published electronically by Public Invention (the organization), but we will also seek a print-publisher who is willing to keep the work open access.

– Robert L. Read

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The Joy of Public Invention

1. "Invent in the public, for the Public."

Benjamin Franklin (1705-1790) did not patent the Franklin stove because he believed it to be too useful an invention to legally encumber. Benjamin Franklin has been called "The First American"[1], but I think of him as the first Public Inventor. If you read the autobiography of Nikola Tesla (1856-1943) "My Inventions"[2], you discover a devout public servant (in a non-denominational sense), who certainly wanted to make money but whose deepest motivation was to see human progress. R. Buckminster Fuller (1895-1983) wrote extensively on the act of invention as a moral act: nerve gas is bad, vaccines are good[3]. Richard Stallman (1953-) articulated the principles of free software and in so doing indirectly increased the wealth and well-being of the planet tremendsouly[4]. This book is my attempt to extend and promote the work of those inventors to create a stronger movement which we could call Public Invention.

Invention is the most spectacular way to advance human progress. It is odd that our politicians mostly ignore it. The story of human history is largely a story of technological advance careening foward from the stone age with a speed which is inexorably, and frightentingly, building, perhaps to a climax. Those who believe it will end in a dark and terrible destruction are not fools; but that fate is not certain. We as a planet can choose instead to build a bright future in which humanity explores the universe together in peace. This will happen only if we understand technology as the powerful moral force that it is.

For the last 100 years, technological advance has been driven by two engines: profit and academic research. The modern emphasis of Universities of patenting research and the governmental practice of subsidizing research which is monopolized by for-profit firms has blurred the distinction. Nations have long recognized the value of technology for competiting with other nations via war or mercantilism. Public Invention hopes to be a movement that does not replace for-profit research and academic research, but becomes a third engine. The motto of Public Invention is "Invent in the public, for the Public."

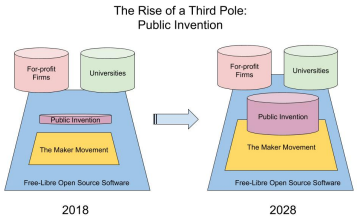

Figure 1.1.: The Rise of Public Invention as a Third Pole of Progress

This means the Public Inventor does not seek monopolies in the form of patents or other intellectual property but gives an invention freely to the whole world without prejudice. Anyone is free to use the invention, including for the purpose of making a profit, but nobody is giving the privilege of exclusive rights to it.

Buckminster Fuller made a clear distinction between what he called "killingry", or weapons, and "livingry"–that which increase the good in the world. The Public Inventor must not build weapons. This is impossible to do perfectly. Even a pillow can be used as a weapon. Nonetheless, technologists are not relieved of the duty to invent good things instead of bad things just because it is intellectually difficult to decide what is good and what is bad. The Public Inventor accepts this burden as does the best they can.

Benjamin Franklin said, "We must, indeed, all hang together or, most assuredly, we shall all hang separately." His wit was poignant because

he meant the American revolutionary leaders would indeed have swung from a British rope for treason if the Revolutionary war had been lost. But in 2021 his words still ring true. Buckminster Fuller believed that humanity would either destroy itself or have a bright, Star Trek-like future—there is no middle ground. We cannot continue to muddle along taking weak action on global warming. The COVID-19 pandemic has shown that we are all connected in a most intimate way, whether we like it or not. A disease incubated in my body may kill you, and vice versa. Therefore the Public Inventor must at some level seek the wealth and well-being of the whole world. Narrow national chauvinism is no longer a useful or profitable behavior.

We could define Public Invention simply as invention in the public interest. In that sense, it is closely related to humanitarian engineering. Humantarian engineering requires a great deal of problem-solving, innovation, and ingenuity. The distinction is that "invention" means something truly novel which has never existed before. Public invention values the truly novel, whereas humanitarian engineering values the truly useful.

In the future, it will be common place for people to move freely between the three engines of for-profit firms, academic research, and public invention. Public invention will not replace the other two engines, but augment them. Public invention is a moral act, but it is not a moral duty. Some people will want to be public inventors some of the time.

The Joy of Public Invention | 2.

Public invention takes the joy of invention and multiplies it by the joy of helping others. Making something truly new is a roller coaster ride of emotions. The inventor is frought with doubts. Is the invention even possible? Has someone done this earlier? Am I too stupid to accomplish this? Often a new idea creates innumerable frustrations. The expensive equipment breaks at a critical momemnt. There may be collaborators, but there are no experts to turn to, because by definition the invention has never been made before. Despite all of the doubts and frustrations, or perhaps because of them, the eventual progress, if it comes, is an intense joy.

Comic books and movies have taken a grain of truth and mythologized out of proportion to create the trope of the lone inventor. Most invention is done by teams. Math, is, in the end, always social. The joy of collaboration is part of the attraction of being a public inventor.

Each of us is unique and has unique gifts to bring to the table. In a sense this is true in any part of life, but it is a especially true in the act of invention. Each of us has a different voice, even if we sing the same song. However, by definition, invention is making something not just new in the sense of a variation of something old, however unique, but new in the sense of breaking new ground. An invention is not yet another rose, it is a new kind of flower. Even mediocre inventors such as myself are essential and necessary. The mediocre work makes the great work easier.

Some people have an invention inside them that has to get out. The seed of an idea planted in childhood may mature in the unconscious until the time is right for it emerge. Sometimes this is because of a persons great love of something. We have all seen people enchanting by flying or infatuated with light. Some people can spend years entranced by a math problem. The inventions may be useful, but unprofitable. Some may even be potentially harmful. Certainly many men, including myself, are fascinated by shooting things at high velocity, such as in guns or rockets or bows or catapults or water guns. So long as the invention is not designed to harm, the invention should be allowed to be born. The line between invention and art is sometimes blurred. The public inventor should support whimsical inventions when a person has a strong desire to make it.

The public inventor should not make fakes or toys. That is, the public inventor should make an object whose value is that it is a miniature version of some other object or like some other object which has intrinsic value. Making a model of a beautiful airplane or ship is valuable and fun, but it is not invention. Making a fake starship is not invention.

However, the desire to make something new even if the utility of the invention is hard to define should be respected. This may be because it is artful, or may have nothing to do with art, and its value may lie in some other dimension. Often, an invention that wants to be made that has no clear purpose is a forerunner of something else which cannot be conceived until the first invention is real and can be held in hand.

To me, public invention is really about love—love of humanity, of beauty, of the planet, of math, and of my fellow-inventors. For some of us, the joys of learning, collaboration, invention, and helping the world melded together in public invention is the greatest joy we can imagine. At the end of my life my proudest acheivement will be my children, and my second greatest sense of joy will come from the inventions I have given the world, however small they may be.

Why it makes more sense than in the past

3.

Participation in public invention makes more sense with each passing decade. Although we suffer from inequity, in raw terms the world is more abundant than ever before. Commodities are cheaper. Fewer people live in poverty. The number of people who are financially able to take a few months out of the work force to work on a public invention project without compensation is higher than ever. People are more generous than ever before. The number of people who make a substantial income essentially through patronage and tipping is probably hire than ever before. In a world of abundance, the need to make a profit or to work relentlessly at a career should become less imperative.

In America today, housing in large cities and formal education are exceptions to the general trend of things becoming cheaper and easier to obtain. Participating in public invention is a powerful way to obtain two things provided by a formal education: the learning and reputation.

There are specific technical reasons certain kinds of public invention are far more accessible than ever before. In the first place, the internet has made many tutorials and how-to documents available almost for free, from how to use a soldering iron to very sophisticated academic papers. Secondly, the free software movement has made an ocean of high quality software available. Although it takes effort, almost any computing task can now be accomplished without paying a cent for software. It remains the case that some of the best scientific tools do not yet have free-gratis alternatives of similar quality, but the trend is incontrovertible: the cost of computing is getting cheaper. I'm writing and typesetting this book right now using mostly free software tools. This same software generally also makes it cheaper to build new software. Usually, software that it free as in free-pizza is free as in free-speech—meaning that anyone has the freedom to use it as a starting point for making something new. Software has limitations, but it is extraordinarily versatile. It is the most general-purpose of all technologies. The fact that it is free is a fundamental enabler of public invention, because capital attracted based on expectations of profits is not needed.

Hardware is more expensive, but has gotten dramatically more accessible at a low price. 3D printers that cost USD$300 can now do astounding things that were not even possible 30 years ago. Similarly, it is now possible to design printed circuit boards on free software and have them fabricated and very low costs, usually in about two weeks. This capability augments the old-fashioned but still useful soldering iron as a means of making sturdy circuits. Of course the reduction in the price of computers, which includes single-chip micro-contollers used in electronic embedded systems is legendary.

Although I am weak on bio-hacking, I believe the same expansion of capability at reasonable cost has occurred in the word of biology and biochemistry. Even optics, in the form of microscopy and teloscopy, has seen major improvements.

Batteris and solar power have enabled deployment of electronics portably and to remote off-the-grid locations. Significant improvements in cameras, sonar, and other sensors have also increased the sophistication available at low cost.

(Create Matrix/Infographic of relative acceleration in fields.)

Although hardware cost remain a relative imepdiment (see Chapter 17 for Public Invention's policy), the combination of cheap hardware, free software, and cheap connectivity has made innovation and invention much easier. Sharing and publication of inventions is a critical part of public invention, and that is also now easier than it has ever been.

4. Social Inventions

Advances in "hard" inventions have made public invention easier, but "soft" inventions also play a role. In particular, practices pioneered by the Free Software movement, such as the way projects can self-organize and use free software and hardware licenses, enable running a project and sharing it freely.

The free and open-source software has developed a set of cultural practices that allow teams to work together. These include:

- cultural dissuassion of unnecssary splitting or "forking" of a project,
- using recognition as an incentive for contributions,
- using version control systems to manage contribtuions,
- and using Agile software methods and big visible charts to manager work.

[1]

1: This is incomplete and others may have a better explanation that I can cite. In particular "the Apache Way" is worth citing here.

An additional practice is that documenters and maintainers are valued nearly as highly as software coders[2] here. This is a cultural practice which is of paramount importance to public invention as a movement. Often, an invention has a kernel of math or ingenuity that can only be created by someone well-versed in the appropriate science and art. However, public invention is a team sport. Every contribution must be honored and valued. In some sports, some positions naturally have more opportunities for drama—the striker on a football team, the pitcher on a baseball team. But teamwork is essential to winning. Those who manage projects, write documentation, help with quality assurance and provide financing are equally important.

2: Cite Eric S. Raymond's "How to be a Hacker"

The value of these cultural inventions cannot be overestimated. But the creation of the GNU General Public License (GPL) [3] is of equal importance. The GPL is brilliant in its simplicity: it gives the user the right to modify and distribute a copyrighted work and works derived from that a copyright work so long as the distributor does not attempt to monopolize the works and gives the derived work freely under the same terms. The GPL and related Creative Commons licenses give creators control over how their work is used. In particular, they may choose to enable re-use, which is the point of public invention.

3: The work of the Richard Stallman and the Free Software Foundation in the creation of the GPL has inspired many other licenses practically created the field and practice now called "free culture". This goes far beyond the GPL, but we can use the GPL as the originating event for these other licenses.

There are also reciprocal licenses for hardware. Hardware designs are not covered by copyright, and so they are fundamentally different. However, this is of no concern to the public inventor, who as a matter a principle is giving away the invention for the whole world to use freely. It would be nice of those who take a device and made improvements to it would contribute those improvements back to the project and the world as the GPL forces in software, but at present our legal structure for doing this is weak. We may, however, rely on the "honor system", which can be astoundingly effective in practice.

- Practices pioneered by the Free Software Movement
- Internet community
- Open Source Software paved the way with certain teachings

- Projects need leaders
- Projects run on the coin of acknowledgement
- Maintainers and documenters are highly valued (quote ESR)
- Licensing matters, but has been pioneered

Imagining what it will be like | 5.

- Infographic of the third pole
- Smooth flow into and out of for-profit business
- Profit becomes one of many tools
- Easy to find a project that resonates
- Easy to contribute something
- But invention will always be hard, or it is not invention.
- Replace vanity with gratitude
- Imagining an altruism driven project landscape
- Art and play in its place rising above infantilism
- How to Achieve a World of Public Invention
- An Ocean of Interesting, organized projects
- A community of sharing
- A means of getting of financial help
- A means of getting mentorship
- Judgement where it belongs

6. Universal Salvation

- Small is Beautiful
- The road to the stars runs through villages and slums
- None of us are free until all of us are free
- Anthropomorphised money does not love poor people
- Nor does it love rich people.
- It wants to accumulate.
- But people love people–we can motivate volunteers this way
- We cannot live together on spaceship earth while we have grinding poverty
- Cutting your own carbon footprint in isolation is of limited value compared to political action—yet we are "sold" such ideas.

The Christian Point of View | 7.

- Jesus never touched a soldering iron, but a soldier's iron touched him.
- Love your neighbor as yourself. (Matthew 22:35-40) – the second half of the great commandment
- The first part of the great commandment implies that all science is theology. By studying his works we study God; there can be no love without knowledge.
- The second commandment requires sharing and egalitarianism.
- If we are called to be little Christs, and God cares for every sparrow, then we must as well.
- Talents must not be buried, and surely those of us who can be inventors have a talent: Matthew 25:14–30 Pauline comments: Whatever your hand finds to do, do with all your heart. (Ecclesiastes 9:10) Each has separate gifts: (Ephesians 4:11-16)
- We are made in God's image; and is not God a Maker and Inventor and Mathematician?

How to Be a Public Inventor

8. Practices

- Motivate yourself through love of humanity, life, and knowledge
- Publish early and often
- Don't seek patents
- Publish your failures
- Seek community
- Help other Public Inventors
- Ask for Help
- Learn by doing
- Failure in service to a big idea plants the seeds of success.

9. What if you cannot be a Public Inventor?

- Give moral support.
- Give money in a way which is spiritually meaningful to you.
  - A small amount given to a small project is incredibly impactful.
  - People aren't compensated, but paying for equipment has a multiplier effect
  - It is psychologically important.
- Try to put yourself in a position that you can
  - Educate yourself.
  - Become financially sound—remove the desire for luxury

Public Invention in the 2020s

10. Public Invention 201: Essential Skills

11. The Technological Landscape

I parts of this book will be read in the year 2100, but this chapter will be obsolete.

12. Selected Invention Ideas

How Public Invention Operates

13. The Invention Team Model

14. Sharing Immediately and Broadly

15. The Public Invention Licensing Policy

Why Public Invention is the best teacher, but is not an educational organization

16.

- People learn best by doing.
- We don't do exercises, fakes, or toys
- Learning has an enormous social component
- Learning is a precessional outcome of Public Invention activity

17. Supporting Material Costs

18. You Can Help

Some more blindtext A.

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

Bibliography

Here are the references in citation order.

[1] H. W. Brands. *The First American: The Life and Times of Benjamin Franklin*. Doubleday, 2000 (cited on page 2).

[2] Nikola Tesla and Ben Johnston. *My Inventions: The Autobiography of Nikola Tesla*. Experimenter Publishing Company, Inc., and Hart Brothers, Williston, Vermont, 1982 (cited on page 2).

[3] R. Buckminster Fuller. *Critial Path*. St. Martins Press, 1981 (cited on page 2).

[4] Richard M. Stallman. *Free software, free society: Selected essays of Richard M. Stallman*. GNU Press, 2002 (cited on page 2).

[5] Brenda Laurel. *Utopian Entrepreneur*. MIT Press, 2001.