



ISSN: 1697-090X

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## WHY IT'S GOOD TO CONSIDER OPEN SOURCE APPROACHES

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Rev Electron Biomed / Electron J Biomed 2003;1(2):112-115.

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### Introduction:

The rise of the Internet has given way to several major advances in technologies. Much of this is due to the enhanced ease of communication provided by e-mail, instant messaging and chat protocols, and the World Wide Web. However, this very technology which allows for the spread of Open Source education and technology was built on Open Source and Open Standards technologies.

One clear example of this is the work of the University of California, Berkeley, which developed the [BSD operating system](#). The networking protocols which form the basis of the Internet, TCP/IP, and their implementations were developed in large measure by this research group and made freely available under an Open Source license for all to use. This allowed for others to adopt this technology, integrate with others in the world, and extend their developments. Without this approach, internetworking would still be difficult, based largely on vendor specific standards and models.

The Open Source license developed by the University of California Board of Regents afforded the Board copyright and recognition for their work, yet allowed for others to access the source code to the technology and use it freely, without restriction on its further use or fee.

### Open Source Defined

Open Source refers to the availability of technologies under licensing terms which guarantee the accessibility of the underlying intellectual property to all without restrictions on modifications or redistribution.

This includes several licenses, such as the GNU Public License (GPL), the BSD license, and the MIT license. These licenses have been applied to several forms of technology and property, such as books, to allow for their public development and dissemination. Users can obtain these resources without complication, make modifications to them and redistribute this technology without undue restriction.

A key protection not waived in Open Source licenses is copyright, meaning that the original authorship of the property is retained. This includes works which derive substantial portions from prior, Open Source works, which are marked as such.

Public domain property, in contrast, waives these rights and protections at the cost of future availability to the underlying technologies. Public domain property is not free software because it makes no protection to the availability of the property for future users.

Open Source is typically called "Free Software," a reference to the freedoms in its use and not in its cost. Although typically used by downloading from sites on the Internet for free, it is this freedom to use, examine, and modify that lies at the heart of the movement.

#### A Viable Business Model

Open Source approaches have frequently met with questions or with a dislike by those who seek to develop a sound business model using these technologies.

However, several successful businesses have used software which is clearly wholly or derived from Open Source properties, including Microsoft, Red Hat, and IBM. All of these companies have developed technologies which they have based on existing Open Source software and technology and added value and used this to build a business model.

One of the common misconceptions for those new to Open Source approaches is that the property, such as software or other material, cannot be sold for profit by anyone. However, this is not the case. Nothing in the group of acceptable Open Source licenses prevents you or anyone from taking the work and redistributing it for profit. What is prevented is someone preventing you from doing this. An additional safety measure is the protection under copyright, which is retained under an Open Source license, and the resulting intellectual property protections.

Furthermore, it is typically assumed that only one license can be applied to any technology, which is also not the case. Because you explicitly have not given up any rights when you choose to license your property under an Open Source compliant license, you retain the right to license the technology to whomever you see fit under any terms. This has included closed source, proprietary license agreements for the producer of the technology and the licensor. This can allow for commercial development of technologies without revealing additional intellectual properties.

#### A Case for Open Source in Education

An educational environment is a perfect setting for the development and use of Open Source technologies for several reasons. This has been demonstrated by several major universities and institutions for many years.

The primary reason for Open Source in educational settings is the access to the underlying technology. Because this access is invaluable in education, much more than the "black box" of proprietary technologies, it makes a natural fit. For example, students and professors can examine the design and implementation of algorithms and examine them. The concept is simple: students of any serious technical field cannot be expected to learn in depth material from "black box" implementations. How can you learn how a protein structure algorithm works if you can't \*see it in action\*, down to the bare code?, how can you evaluate the implementation of the theory in this case?. You can't study genetics without looking at genome sequences, you can't study medicine without access to anatomy. Open source is exactly analogous to all of this, it's opening the hood on intellectual materials, a paramount concern in education. This is clearly important in the continued development of Internet protocols by several major institutions, including Carnegie Mellon University in the United States and the [KAME research group in Japan](#).

The secondary reason for an educational or professional institution to adopt Open Source technologies is the adherence to codified or accepted standards. This can include fundamental protocols such as the Ethernet networking standard or even data expression formats such as the Protein Data Bank's file format. The development of RasMol, an Open Source molecular visualization

tool, helped to spread the adoption of the PDB technology and allow for life science researchers to communicate with each other in a commonly accessible language. This package was developed and distributed by the UK pharmaceutical company Glaxo-Wellcome.

An equally important reason to adopt Open Source at an educational facility is the name recognition afforded to the institution, its faculty and researchers, as well as its students when a project is developed and supported. An example of this is the [OpenLDAP](#) software suite, developed by the University of Michigan, which implements the LDAP information storage and communication format. This software package, freely available under an Open Source License, gives prestige to the University and is a clear demonstration of its computer science department's abilities. This package is widely accepted as a de facto standard and forms the basis of many commercial LDAP packages.

## Conclusions

This essay has attempted to briefly outline a case for an educational or professional institution to adopt the use and development of Open Source technologies. Throughout the past 20 years, history has shown that several businesses and educational institutions have successfully bolstered their prestige and research profile by using the fruits of and contributing to the Open Source community. Furthermore, for those wishing to develop a business based on this research which was developed under an Open Source model, there are several historical examples of successful transfers to a proprietary business model from this open history.

## Resources

These resources should serve as excellent starting material as you begin to investigate the adoption of Open Source technologies in your institution.

1. <http://www.gnu.org/philosophy/categories.html>
2. <http://www.opensource.org/advocacy/faq.php>

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Comment Reviewer by Seth Arnold. Immunix, Inc. Oregon. USA [sarnold at wirex.com](mailto:sarnold@wirex.com)

Dr Nazario's article clearly articulates the possibilities the Open Source software development model has to offer, without the vituperousness of many apologists.

I hope Dr Nazario's essay provides a starting point for constructive conversations regarding the use of Open Source software in your organization.

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Comment Reviewer by Guy Brand. ISIS, Louis Pasteur University. Strasbourg. France [bug at uninet.edu](mailto:bug@uninet.edu)

Through this paper, Jose Nazario clearly underlines some major advantages of Open Source and Open Standards technologies. Most of the research communities based their internetworking developments on vendor independent standards and models which have let them innovate freely and share their knowledge. Source code, as a shared knowledge, when put under license terms that allow its use and REuse, is comparable to scientific knowledge that gets spread over the worldwide community of researchers (respecting copyrights of authors). The fundamental role of the license under which a source code is released is perfectly illustrated in the hidden aspect of proprietary software.

How many friends, colleagues or users have asked why their software is missing some important

functions or has buggy implementations. A proprietary software imposes the OS you have to use and even worse, it can steal your data and keep them imprisoned in closed or undocumented formats. Where would research be today if programs, experimental conditions, measurements and models would all be closed knowledge ?

Closing a model, hiding code sources or patenting an algorithm can only delay the discovery of alternatives. In matter of education and research, the freedom of choice and the ability to share knowledge is essential. Open standards and formats are the keys to efficient and perennial knowledge sharing. Many scientific softwares or formats are still dependent on a very few number of companies pushing their "solutions".

Interoperability is often a problem that cannot be solved because there are no standard formats or because dominant proprietary software ignores existing standards. Things change... slowly. How could education be without access to the underlying technology ? Can teaching be a collection of recipes which should be applied to black boxes ?

A lot has been written on laws enforcing or promoting the use of OSS in public institutions or states. The important point is to conform to open formats for data. This is certainly even more important than the software processing these data. If the format is opened, free of use, documented and evolves, users are free to use the software (proprietary or not) they like, this is the key to computing in the service of human and not the opposite.

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Comment Reviewer by Fernando Tricas. Universidad de Zaragoza. España [ftricas at uninet.edu](mailto:ftricas@uninet.edu)

Dr. Nazario's essay is a good introduction that gives some reasons to use open source software in research and educative environments. It concentrates on economic aspects, explaining the business model around this way of producing software, but also on educative aspects, an also on name recognition.

From these points of view, the author provide several examples that can serve us as a source of inspiration when considering the open source approach.