

Free Software, Open Access Repositories and Open Hardware for the Development

Democratizing innovation and access to knowledge

In many developing countries and regions we see tremendous efforts to foster economic growth. Indeed, those countries are affected by huge discrepancies in access to social welfare and sometimes to basic needs for their population. Those political difficulties are often serious and they may endanger the world security due to the tendency of the governments to shift their politics towards the military approach to increased social and political difficulties. Many governments realized that social welfare and economic growth may be realized by increasing capacities to involve larger number of scholars, scientists, engineers, companies, NGOs and various civic initiatives. On the other side, experience shows that a lack of such capacities cannot be compensated for by increased lobbying of politicians to increase control over product and service users. Thus, freedom of innovation and follow-on innovation, access to information and knowledge become an important factor in fostering economic growth in developing countries so developers do not need to reinvent the wheel in solving each problem. Consequently, governments should support further development of a legal framework that will provide incentives for those who are creative to disclose their innovations to other contributors to the innovation process. Open-access repositories of scientific, cultural and scholarly documents and data become essential resources of knowledge and information that help developing countries to easier overcome numerous difficulties. More than 250 educational and scientific institutions provided their dissertations, research and other scholarly documents available to the public. Value of such repositories is enormous and medical, agricultural and other documents literally save lives of many people worldwide. Thus, international science and technology fora may serve for the good of people in any country including developing countries. A good example is the Processor Architecture Laboratory at the School of Computer and Communication Sciences. (<http://lap.epfl.ch>)

Users are smart!

Eric von Hippel [1] have observed that the relationship between users and manufacturers is not one-way. In many cases, manufacturers are not just entities that manufacture product that users will use and wait passively for another product to appear on the market. Users are not just purchasers, they are often smart, intelligent and highly skilled people that understand the purpose of the product and technology that may improve certain product. Indeed, the users are often inventors and serve as informal advisors and even small R & D labs that suggest to manufacturers how to improve their products or which new products they have to introduce to the market. Thus, fear of openness should not be justified, since creation of incentives for innovation may help in building new business models and technologies that will help transform certain industries, and introduce of new jobs, products and services.

Technology is place and tool of freedom and development

The phenomenon of the free software movement is a typical example of mainly informal gathering of developers and users developing free software with the aim of fostering democratization of innovation and use of software. Paradigms of free software (Free Software Foundation www.gnu.org) and open hardware emerged as a result of human need to protect and develop its liberties in the technological field too. There are hundreds of thousands of people involved in such projects, whether they are software developers, demanding users and testers, researchers, or engineers faced with certain technological problems. Nowadays, tens of millions of people benefit from using the results of their efforts. Despite a variety of sorts of free software it is emerging trend to create system development environments that enable users to create their own distributions of software customized for specific purposes. However, such a trend is not just technological curiosity. It is genuine need that users own their own development in order to manage it properly. OpenSDE

(<http://www.opensde.org>) is an example of environment that is aimed to very flexible customization of creation of desired distributions of software enabling users to optimize software according to specific needs of certain community.

Beside free software there are emerging initiatives for the design and development of open hardware. Jamil Khatib in his paper [2] “Free Chips for All” gave his view of open hardware: “All design files should be available for free. This includes schematic, HDL, and layout files. Software and firmware interfaces such as drivers, compilers, instruction set, and register interfaces should be available and open source. All information and documentation, like application notes and interfacing information, should be openly available. In short, all information needed to modify, use, and implement the hardware design should be available for free in order to designate a project as complying with the open hardware specifications.”

For example, Xilinx Inc. (www.xilinx.com) sells some of their products with implementation instructions, schematics and gerber files. By doing so, Xilinx Inc. enabled engineers to have shorter time-to-market or time-to-implementation and fostered its sales. The same method is in many cases used by the company Cirrus Logic Inc. (<http://www.cirrus.com>) that gives away for some of its products complete documentation including gerber files, schematics, diagrams and support. The US company Genesi Inc. (<http://www.genesi-usa.com>) published the design of their motherboard PegasosPPC that is based on the PowerPC platform. That tendency is also followed by the Sun Microsystems Inc. (<http://www.sun.com>) and increasingly with others too.

Citizens should be owners of the development

With little effort by local developers and knowledge gained from open-access repositories and Internet for an open hardware may be an e-learning tool, VoIP access point, Internet access point, patient monitoring device, telecommunication device, thin client, small server, router, local community accessible information center, network of various sensors et cetera. But, application fields where citizens have already contributed significantly are manifold. Actually, projects that improve the functioning of the public sector, development of software and hardware for ecological preservation and protection, development of tools for optimization of traffic, pollution measurement, grid technology based distribution of open access repositories of scientific and other scholarly documents, development of tools for broadcast or production in arts, culture, mass media, communication and coordination in disaster and relief operations are taking place and they grow slowly but steadily. The citizens themselves started to realize projects that enable enterprises to have a more inclusive employment policy and projects that directly foster economic growth (developing of software and hardware that may improve optimization and industry process control, introducing new technologies and opportunities for business development, improving telecommunication infrastructure and various telecommunication services, increased interoperability and various optimizations). Obviously, democratized innovation is gaining its momentum yet worldwide implementation of its results is lagging. But, nevertheless tools are there around use and additional efforts by international NGOs is yet to be done.

References:

- [1] Eric von Hippel, *Democratizing Innovation*, The MIT Press, Massachusetts Institute of Technology, 2005
- [2] Jamil Khatib, *Free Chips for All*, IBM developer works, Open source library, pp. 2, August 2000