Openness as an evolutionary determinant of human existence

Wim Westera
Open University of the Netherlands
wim.westera@ou.nl

Abstract

The topical pursuit of the 'openness' of software, content and other affairs surpasses the simple idea of making products available and accessible for users free of charge. Rather than financial, economical or technical arguments the open source movement strongly exhibits the moral aspects of open source, while referring to the equality of human individuals and their rights for equal opportunities and accessibility to relevant sources. By that, it opposes against established economic forces and expresses an ideological and, perhaps, revolutionary doctrine. In that respect the open source movement shows strong similarities with pressure groups, political factions and other movements that plead for fundamental change, if not revolution. This paper investigates the concept of openness from a linguistic, a historical and an existential perspective, respectively. It describes how the transfer of 'openness' from the domain of culture to the domain of technology can be explained and substantiated. It reveals the motives and implications of open technologies by referring to the fundamental dependence of humans and technology, and the evolutionary benefits of 'openness' for human existence.

1. Introduction

By the end of 2004 Philips, the well-known Dutch electronics company changed its marketing slogan. The old slogan "Let's make things better" was often ridiculed, because of its suggestion of an ashamed apology for failing developmental staff. The new slogan "Sense en simplicity" seems to display much more of the company's self-confidence.

Figure 1. Launch of the new Philips slogan

Philips argues as follows: 'Technology exists to help make our lives easier and more productive. So why is it so often such a hassle, full of complexity and frustration? At Philips, we believe that technology should be as simple as the box it comes in. It's this very simplicity that transforms a task into an opportunity, a burden into a pleasure. Simplicity can be a goal of technology. It certainly is the goal at Philips. It just makes sense.'
For consumers this statement signifies the reassuring message not to bother, worry, think or try to understand the apparatus, but only press the button. The positive part of this idea is that

it stresses technology's role in liberating humans from burdens and to provide a relief and enrichment of human existence. Such positivist notion of science and technology was first published in Bacon's futurist book "New Atlantis" (Bacon, 1626): it describes a utopian society whose well-being is entirely based on the sensible application of science and technology, including skyscrapers, refrigerators, airplanes and telephones, a long way before these actually were invented. With its slogan Philips chooses not to annoy people with the complex internal structure of the apparatus: it thus promotes a closed source technology approach, by literally concealing the apparatus' machinery. And to be fair, if you would like a cup of coffee, what would you want more than "simply and sensibly" push the button and enjoy the product's result? It is the result that counts, isn't it?

Figure 2. Philips Senseo: a revolution in enjoying coffee

Now, the case of the automatic coffee-machine is instructive in that it establishes a successful and 'sensible' argument for closed technologies. It may serve as a metaphor to assess the significance of closed source and open source technologies: is it really necessary to see what is inside the machine? It may even serve as an argument to challenge supporters of the open source movement.
In many respects, the open source movement seems to reflect an ideology rather than well-established line of thought that is based on sound scientific, or even practical evidence. Adherents are convinced that open source is necessary to achieve innovative software applications that support functional flexibility, user-led adaptability and the unhampered exchange of data. It opposes against existing business models that amplify the competition-based tendency to confidentiality, shielding and business patents. It thus opposes against established economic forces and expresses an ideological or even revolutionary doctrine to pursue a better world, a better life or a better future for mankind. Essentially, such premises do not differ essentially from articles of faith in religion, astrology, fortune telling and politics (in random order). The open source movement shows strong similarities with pressure groups, political factions, fundamentalist currents and other ideology-driven movements that plead for radical changes. It is important to note, however, that a great many of these action groups are doomed to disappear as a matter of course, as people gradually tend to abandon their revolutionary claims and conform to existing patterns. Clearly, such conclusion would be very disappointing and sobering for the open source movement.
This paper explores the potential significance and viability of the open source movement. It does so by investigating how the transfer of 'openness' from the domain of culture to the domain of technology can be explained and substantiated. To this end, we will first take up a linguistic perspective to explore the concept of openness and its connotative meanings. Next, we will present a historical overview that focuses on the genesis of modern society and the emergence of new and open technologies. Third, we will analyze the openness of technology from an existentialist perspective: we will explain the fundamental relationship of humans and technology and connect this with the open source ideology. In conclusion, we will combine

our findings to analyze the evolutionary benefits of openness and assess the chances of survival of the open source movement.

2. Ideals of the open source movement

In short, the core idea of open source is that the origins of a product (typically software) are publicly accessible in part or in whole (Wikipedia, 2005; Vries, F. de & Nadolski, N., 2004). Software that is developed under the open source license (GNU General Public License, 2005; Free Software Foundation, 2005) makes available the source code and its documentation to other users and developers. Other developers may join the open source community and improve pieces of source code, add new applications, port it to new operating systems and processor architectures or simply review or test existing products in order to achieve better quality software. Although a coordinating framework or group (Open Source Project) is necessary to gear separate activities to one another, the software development takes place in a highly autonomous and self-regulated way. Such approach creates a rapid evolutionary process, which produces software at surprisingly high speed compared to conventional software development methods. It is often claimed that open source software development amplifies innovation (Goldman & Gabriel, 2005). The self-correcting nature of the open source community is assumed to yield products that are understandable, well-documented, well-tested, modifiable, duplicatable and simply accessible. Users for their part are entitled to install the software without any license fees to be paid. Such absence of financial barriers creates the potential of large numbers of users. Also the common vendor lock-in, which denotes the inescapable dependence of a single commercial software provider, is avoided. Users will be supported by a community or may hire expertise from any company that has adopted the software. Increasingly, commercial software developers like IBM, Oracle, Ordina or Cap Gemini change their business strategies and adopt the open source model which focuses on support services rather than software licenses.
The open source considerations also apply for open standards (IMS, 2005). These concern publicly approved protocols and formats for data-exchange and data-storage. Naturally open source software is fully based on open standards. Increasingly proprietary software attempts to conform its interfaces to open standards so that the exchange of data with other systems is supported. Yet, specific constraints of the interfaces due to the applied implementation method are seldom made public. This also holds for the code of the internal routines and proprietary data formats. By analogy with open source software and open standards, open content refers to any creative work including text, graphics, pictures, audio or video that may be used, copied or distributed without charge. The so-called Creative Commons Licenses (Creative Commons, 2005) intend to stimulate and facilitate the actual use and sharing of information by avoiding the impediments in current copyright laws. Through a variety of licensing and contract schemes copyright holders are allowed to grant some of their rights to the public while retaining others. Open source, open standards and open content share the idea that proprietary claims hinder the products' accessibility. Its plea for openness emphasizes cooperation and transparency rather than competition and secrecy. It thus opposes established copyright claims of providers by suggesting a new business model.

3. A linguistic perspective: the concept of openness

As a first step to trace the origin and meaning of the ideology of 'openness' we will take up a linguistic viewpoint. The word 'openness' often creates positive associations. Shops, restaurants and museums are meant to be open, to welcome us and to satisfy our needs. Frustration arises each time we stumble across a shop that is closed, because, naturally, shops are not designed to be closed but are inextricably bound up with a fundamental and literal openness. As is the case with many linguistic utterances, the significance of the word 'openness' is determined by its connotations rather than by its literal meaning. Openness not only refers to a system's state of susceptibility for external stimuli, but it also signifies transparency, accessibility, frankness, fairness, hospitality, proximity and readiness for communication. Many connotations of openness suggest positive appreciations when applied to human behaviour or social attainments: having an 'open mind' clearly indicates a positive attitude towards new insights and perspectives; keeping 'open house' or having an 'open discussion' seems to be preferred above their closed counterparts; the 'open admittance' for students of the Open University of the Netherlands is a sympathetic gesture to anyone who aspires to enter higher education, regardless of formal qualifications. In contrast, 'closeness' is

associated with inaccessibility, secrecy, reserve, refusal, rejection, reticence, isolation, exclusion and many other concepts that indicate barriers for interaction. The concept of 'closeness' has unmistakably negative connotations.
Yet, it would be naive to label openness as being absolutely right and closeness as being absolutely wrong, because such statements would lack universal significance. Indeed, the word 'closeness' may have positive connotations as well. Private information, for instance medical files, may cause serious problems when they become subject of open publication or distribution. Keeping the files closed will be highly appreciated by the persons involved. Sometimes it is even advisable to shield patients from their own personal data, for instance in the case of minor of major medical risks: do we really want to know the statistical life expectancy that goes along with the possible diagnosis of genotypic, mortal disorder? The doctor's transparency may have adverse effects on the patient's mental well-being. Another example would be the so-called 'press embargo' which obliges journalists to close any communication about a certain news item until an agreed release moment. Paradoxically, this act of secrecy supports the functioning of open, free press, while it creates equal chances for different newsagents to receive and investigate the information concerned. And what about the Nuclear Non-Proliferation Treaty, whose objective is to prevent the spread of nuclear weapons and weapons technology? Clearly, this is an example of closed content and still it enjoys (almost) worldwide support. A final example would be a penitentiary or a psychiatric institution. We would like to keep its doors closed, while their openness would cause great indignation for the majority of people, be it not for its prisoners or patients (figure 3).

Figure 3. Wanted

Obviously, the concept of 'openness' is loaded with subtleties that impede a straightforward assessment in terms of positive or negative meaning. It would be naïve to conclude about the usefulness or viability of open source, just by some superficial linguistic associations that seem to reflect smart marketing rather than true ethical meaning. It is unbecoming to simply qualify the open source developers as the good guys and the closed source developers as the bad guys. With such absolute claims we would make the same mistake as astrologers, sect leaders or fanatic clergymen. The semiotic assessment of openness highly depends on the prevailing standards and cultural principles that act as a frame of reference for value judgments. In order to make progress we would need to identify agreed and accepted starting points for such framework. We prefer to take a different route. In the next section we take up a historical perspective to describe the emergence (and decline) of openness and open technologies in modern society.

4. A historical perspective: the rise and fall of openness

For many centuries the Bible has been the single example of open content. When the poor men could not afford a copy, clergymen were happy to read the holy texts in public on a weekly or even daily basis. Its openness, however, flourished by the simultaneous concealment of rival ideological content. Such monopolistic position reflects an ideological or even totalitarian doctrine rather than the free exchange of ideas between people. So while the

church provided open access to all the people, it did not go with the opportunity for individuals to choose. Here we come across an important feature of open content: indeed, diversity and the associated possibility of individual choice. The opportunity to choose is strongly related to the notion that human beings are highly independent, autonomous and responsible individuals that take their own decisions as for what books or newspapers to read or what faith to adhere (cf. press freedom, freedom of religion). The liberation of the Christian doctrine goes back to the Enlightenment, an intellectual movement in the 17th century and 18th century that strongly influenced the portrayal of mankind. It marked the liberation from the medieval doctrines of magic, superstition, prejudices and the fear of God by replacing it with human rationality and a scientific description and explanation of the world. Beliefs are not anymore accepted on the authority of priests, sacred texts or tradition, but only on the basis of reason. Not without great sacrifices (viz. Galileo Galilei) academic content acquired the status of open content by defying religious bans like the Index librorum prohibitorum of the Catholic Church. Ever since, a flood of new technologies became available. Although some of these had magical characteristics that were hard to understand (cf. the telescope), most technologies were simple and mechanical in kind and obvious for laymen (clockworks, steam engines, arms). These initial technologies were open technologies per se; because of their relative simplicity anyone could see how they worked and could replicate them.

Figure 4. Open technology: Galileo's pendulum clock

As science and technology progressed however, many new technological artefacts became available which internal operation is hard to understand. Computers, telephones and cars are complex technological devices that are being used extensively by users that mostly have not the slightest idea of what is inside and how it works. Even though the level of education is much higher than a few hundred years ago, technology is becoming more incomprehensible day by day, which seems to create a magical aura of medieval style. Through proprietary solutions and industry patents even technology experts stay ignorant about the devices' internal operation. The majority of users display an unrestricted pragmatism and goal-orientedness that consider technology as a mere instrumental utility, simply a practical means to arrive at an end. If we want to take the car from A to B, why should we bother what's underneath the hood? Why bother about the coffee machine's interior: it is the coffee's taste that matters! Accordingly, 'techno-illiteracy', especially computer-illiteracy, is growing (European Commission, 2005) and the people involved even seem to form an established subculture showing off its ignorance by degrading technology to a mere commodity. We seem to prefer plane consumerism rather than critical independence.

5. An existentialist perspective: humans and technology

The origins and effects of technological consumerism have been extensively investigated by Borgmann (1984), Jaspers (1931) and Heidegger (1977) and others. According to the existentialist Borgmann, technology promises a relief and enrichment of human existence. It liberates humans from burdens by making available a multitude of goods like heat, light, water, food, information, etc., without any effort whatsoever (figure 5).

Figure 5. Light as an incomprehensible commodity

It thus embodies the idea of easy consumerism. In ancient times, our ancestors needed a full day's work to find enough food, gather wood, make fire etc., while today, we dish up a ready-to-eat meal within a few minutes. Those were tough times: lighting the stove required knowledge, but also dedication, perseverance, goal-orientedness and involvement with the tools available. Today, the availability of goods is straightforward, omnipresent, easy, safe and immediate. Heat, light, information and coffee become available by simply pressing a button. What used to be an achievement has become a simple commodity, which demands no commitment, proficiency and skills acquired by effort, discipline and involvement with the world. The efforts are now taken care of by the device's machinery. In most devices the machinery, i.e. the technology, is deliberately kept out of sight. According to Borgmann, such pattern of separating the commodity from the machinery only leads to apathetic consumption, which is detached from any social or material context and which removes the involvement with the world. Blindfold, we locate and operate the switches that provide us with what we need, without wondering a single moment where this all comes from (cf. figure 5). Inspired by the negative effects of the industrial revolution, the existentialist Jaspers (1931) advocated his alienation thesis: technology creates a totally new material environment and causes human beings to become alienated from the world. Through mass production, human individuals are becoming more and more ignorant of the origin, composition or functioning of industrial products, be it food, clothes or consumer electronics. Prevailing values like economy, frugality and sustainability lose ground because of the availability of many identical and exchangeable duplicates. People are supposed to be trapped in a pattern of passively fulfilling their material needs by ever-replaceable stuff that is abundantly available (Verbeek, 2000).
While the Enlightenment marked men's liberation from medieval doctrines and the emergence of today's technology-based society, technology in turn seems to counteract this liberation by alienating humans from the world and making them completely dependent on the support of experts: without the help of doctors, lawyers, bakers, computer specialists, heating engineers and plumbers, we would pine away. According to Borgmann's devices theory, closed technologies, viz the concealment of the device's machineries, will affect human existence and, in the end, lead to the destruction of mankind. This conclusion would be a reductio ad absurdum for the support of open technologies.
Borgmann (1984) calls on breaking out this technological consumerism not by simply rejecting technology, but by claiming that technology should be open in kind: visible, accessible, adjustable, repairable. Borgmann's devices theory suggests restoring the relationship between the commodity and the machinery. Users of technological artefacts should be given the

opportunity to develop commitment with it. Devices should preferably be transparent and reveal the secrets of its machinery. To amplify the users' involvement, devices should also be adjustable to personal preferences. By making its machinery accessible, users are able to maintain, repair and adapt the devices. Indeed, from an existentialist view involvement is more important than availability. Borgmann suggests devices that support "focal practices", that is, activities that demand high degrees of involvement, that require discipline, perseverance, concentration and skills, that are physically and mentally challenging and are difficult to master, that provide satisfaction and pleasure, that stimulate rather than discourage our ties with the world and that serve no particular goal other than being a focal practice. Examples of focal practices would be walking (instead of taking the bus), cooking (instead of ordering a pizza), repairing an old bicycle (instead of buying a new one), collecting stamps, or any other activity that demands intrinsic involvement and hence serves our existential relationship with the world.
Now, this situation also applies to software. Software pre-eminently allows focal practices, while it provides many opportunities for user involvement: user-defined preferences, active object manipulation, real-time events, multiple representations of data, intelligent responses and participation in games and communities, among other things. The more open the software is, the more opportunities for involvement it provides. Of course it is not always the availability of source code that matters. The openness of software corresponds with the degree that users are able to access the software's functional "machinery", understand its operation and are able to adjust it to their own preferences. While in many respects software is becoming a critical factor in human existence, politics has widely adopted the idea to promote user involvement. The European Council has labelled digital literacy as one of its key objectives in order to establish a strong European identity, favourable conditions for the knowledge economy, active citizenship and social cohesion (European Council, 2000). Rather than learning operational tricks (pushing the right buttons for magical effects), digital literacy should focus on functional insight and understanding of software's machineries.

6. Synthesis

We have stated that the open source movement strongly resembles an ideology driven action group and, by analogy, we wondered about its chances for the future. To this end we have analyzed the concept of "openness" from various perspectives in order to assess its significance for survival. From a linguistic analysis we have concluded that the concept of "openness" tends to indicate positive meanings, but that it is also loaded with subtleties that impede a straightforward assessment in terms of positive or negative meaning. Naturally, just some superficial linguistic associations cannot establish the usefulness or viability of open source. Subsequently we have identified the Enlightenment as the cradle of modern society while it liberated man from magic, superstition and other medieval doctrines. It fostered human individuality and human autonomy, it created cultural diversity and it promoted open content and new open technologies. As technology became more and more complex, however, users were doomed to accept the technology-induced commodities as mere facts of life that, fortunately, relief human existence by liberating it from heavy burdens. From an existentialist view we have noticed that the drawback of this pattern is that it tends to degrade users to apathetic consumers, who simply press a button to satisfy their needs and who are discouraged to wonder what is inside, where it originates from, how it is done and how it operates. In due course, people alienate from the world they live in, they become more and more ignorant of the origin, composition or functioning of industrial products and cannot but accept the commodities as magic agents to satisfy there needs. Such attitude is even furthered by the deliberate concealment of the device's machineries. Such closeness reflects an instrumental view on technology, which is destructive in kind, as it captures people in a pattern of passively fulfilling their material needs. Indeed, the Philips motto of "sense and simplicity" is likely to create dumb, lazy and dependent users, while it causes alienation from the world rather than user involvement.
At this stage the evolutionary effects have to be considered. According to Charles Darwin and Jean-Baptiste Lamarck, suns of the Enlightenment, survival depends on our ability to change. The Enlightenment itself can be libelled an era of change, if not revolution. It furthered openness and it proclaimed the ideology of upward development, progress and improvement of the world, encouraged by an ever-increasing knowledge, understanding and control of nature's processes. Abandoning change means stagnation, stagnation means decline and eventually extinction. While closeness of technology, viz. the concealment of the artefacts' machineries, is associated with passivity rather than change, it will affect human existence and,

in the end, lead to the destruction of mankind. Dumb, lazy and dependent humans will not be able to change and to adapt to changing conditions. The decline doesn't only concern our economy but will affect our culture as a whole. In contrast, openness is assumed to progress our ability to change and to amplify innovative power (Goldman and Gabriel, 2005). According to Borgmann (1984) technology should be open in kind by restoring the relationship between the commodity and the machinery: it should be visible for its users; it should be accessible, adjustable and possibly repairable in order to allow active user involvement. While closeness is destructive in kind by promoting inertia, openness is associated with adaptation, commitment, continuous development, growth and change. It suggests that openness is a precondition for survival. And this also holds for software.
But there is more to say to it. First, through the complexity of technology only few people will be able to understand the internal operation of a particular product. How many mobile callers will understand the mobile communication protocols and how many computer users have knowledge of their interrupt channels or processor drivers? Secondly, even if we would be able to understand all this, does it make sense at all? Cannot we just sit back and enjoy the commodities without bothering what is inside?
As for the first comment: we need to discern different types of user involvement. Westera (2005) suggests the following 4 types (table 1):

Table 1 Levels of involvement with technological devices

Type of involvement	Description
Sensory involvement	The device's machinery is visible, audible or tangible
Conceptual involvement	By revealing the machinery's functional components, it becomes clear how the device operates, even when most technologies are often too complex to be fully understood by laymen
Operational involvement	Users can practically and diversely interact with the devices, in order to develop their own unique methods and routines of use (cf. a piano)
Material involvement	Substantial accessibility to the machinery enables users to care for it, to maintain it and to carry out repairs and upgrades.

Table 2 Levels of openness for different software user types

User type	Level of understanding	Level of involvement
Consumer	Effects of pressing buttons	*Plain commodity:* Browsing, calculating the logarithm, etc.
Interested user	Functioning and roles of components	*Conceptual involvement:* Adjustments, personal profile and reconfigurations
Productive user	Detailed functioning and operation of some features	*Operational involvement:* Creative outcomes
Technical support	Detailed functioning and operation of all features	*Operational involvement:* Problem solving
System manager	Technical requirements, networking and operating system	*Operational involvement:* Installation and integration
System architect	Interfaces and functions	*Material involvement:* Integration and implementation
Software developer	Programming	*Material involvement:*

		Editing and programming
International working groups	Protocols and standards	*Material involvement:* Specification

The framework in table 2 contains an important message for the open source movement. Because software that is developed under the open source license only makes available the source code and its documentation to other users and developers, it is clear that its openness only covers the high end, specialist user levels. Consequently, the evolutionary benefits of open technologies and its chances of survival are limited, because the majority of users may still be fed up with simple closed software buttons that conceal the software's machinery and impede true user involvement. To be successful the open source developers should not only make their source codes available but should also enable various levels of user involvement.
And what about the second question: does it all make sense; cannot we just sit back and enjoy the software commodities? The answer is simple: no, we cannot, unless we opt for a digital divide encompassing large groups of apathetic consumers, who switch off thinking and experience the world as an incomprehensible black box. The premises of modern society and the associated human rights make such digital divide unacceptable. Both software developers and software users have to make efforts to stimulate sufficient technology involvement. For a start, the European Community has introduced the European Computer Drivers' License (ECDL, 1996), which supplies and certifies the baseline computer knowledge that individuals would need in the digital age. Perhaps we should also consider a technology doctrine at schools, as is already fully accepted for reading, writing and calculus: an educational obligation, which provides basic insight in modern technological devices, a social obligation in order to avoid dropouts.
In sum, our analysis demonstrates that closed technologies are destructive in kind, by promoting inertia. Open technologies, however, including open source software are accessible, adjustable and possibly repairable in order to allow active user involvement. Openness enables adaptation, continuous development, growth and change and thus is a precondition for survival. Indeed, the open source movement will have high chances of survival, be it that its products should not only provide openness for software developers, but should also provoke various types of involvement for different user types. To be fair, we really would not resent anyone the ease of "simply and sensibly" pushing the button and enjoying the product's result. But we urge to recognize the patterns and effects of alienation and apathy. Occasionally, it may be wise to make coffee in the traditional way (figure 6). It will not only create pride and self-fulfilment. In the end it will taste better anyhow.

Figure 6. Open technology for making coffee

7. References

Bacon, F. (1626), The New Atlantis. In: Ideal Commonwealths, New York: The Colonial Press, P.F. Collier & Son, internet wiretap edition, retrieved October 5, 2005 from http://oregonstate.edu/instruct/phl302/texts/bacon/atlantis.html
Borgmann, A. (1984). Technology and the Character of Contemporary Life. Chicago/London: University of Chicago Press.
Commission of the European Union (2005). European E-Learning programme, retrieved October 5, 2005 from http://europa.eu.int/comm/education/programmes/elearning/programme_en.html
Creative Commons (2005). Homepage, retrieved October 5, 2005 from http://creativecommons.org
Heidegger, M. (1977). The question concerning technology and other essays (trans. Lovitt, W.), New York: Harper and Row.
IMS consortium website (2005). Homepage, retrieved October 5, 2005 from http://www.imsglobal.org
Jaspers, K. (1931). Die geistige Situation der Zeit. Berlin: Göschen.
Free Software Foundation (2005). Homepage, retrieved October 5, 2005 from http://www.fsf.org
GNU General Public License (2005). Article, retrieved October 5, 2005 from http://www.gnu.org/copyleft/gpl.html
Goldman, R. & Gabriel, R. P. (2005) Innovation Happens Elsewhere: Open Source as Business Strategy, San Francisco, Morgan Kaufmann Publishers.
Vries, F. de & Nadolski, N. (2004) Open source toepassingen in modulaire Elektronische Leeromgevingen, ELO's flexibel en op maat, Utrecht, Stichting Digitale Universiteit from http://hdl.handle.net/1820/269
Verbeek, P. (2000). De daadkracht der dingen. Amsterdam: Boom.
European Council (2000). An agenda of economic and social renewal for Europe, Brussels, retrieved October 5, 2005 from http://europa.eu.int/growthandjobs/pdf/lisbon_en.pdf
European Computer Driving License Foundation (1996). Homepage, retrieved October 5, 2005 from http://www.ecdl.com
Westera, W. (2005). Beyond functionality and technocracy: creating human involvement with educational technology. Educational Technology & Society, 8 (1), 28-37. From http://www.ifets.info/journals/8_1/6.pdf
Wikipedia (2005). Article, retrieved October 5, 2005 from http://en.wikipedia.org/wiki/Open_source