



# Fifty shades of open

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### Abstract

Open source. Open access. Open society. Open knowledge. Open government. Even open food. The word "open" has been applied to a wide variety of words to create new terms, some of which make sense, and some not so much. This essay disambiguates the many meanings of the word "open" as it is used in a wide range of contexts.

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### Introduction

Open source. Open access. Open society. Open knowledge. Open government. Even open food. Until quite recently, the word "open" had a fairly constant meaning. The over-use of the word "open" has led to its meaning becoming increasingly ambiguous. This presents a critical problem for this important word, as ambiguity leads to misinterpretation.

"Open" has been applied to a wide variety of words to create new terms, some of which make sense, and some not so much. When we started writing this essay, we thought our working title was simply amusing. But the working title became the actual title, as we found that there are at least 50 different terms in which the word "open" is used, encompassing nearly as many different criteria for openness. In this essay we will attempt to make sense of this open season on the word "open."

### Opening the door on open

The word "open" is, perhaps unsurprisingly, a very old one in the English language, harking back to Early Old English. Unlike some words in English, the definition of "open" has changed very little in the intervening thousand-plus years: the earliest recorded uses of the word are completely consistent with its modern usage as an adjective, indicating a passage through or an access into something (*Oxford English Dictionary*, 2016).

This meaning leads to the development in the fifteenth century of the phrases “open house,” meaning an establishment in which all are welcome, and “open air,” meaning unenclosed outdoor spaces. One such unenclosed outdoor space that figured large in the fifteenth century, and continues to do so today, is the Commons (Hardin, 1968): land or other resources that are not privately owned, but are available for use to all members of a community. The word “open” in these phrases indicates that all have access to a shared resource. All are welcome to visit an open house, but not to move in; all are welcome to walk in the open air or graze their sheep on the Commons, but not to fence the Commons as part of their backyard. (And the moment at which Commons land ceases to be open is precisely the moment it is fenced by an owner, which is in fact what happened in Great Britain during the Enclosure movement of the sixteenth through eighteenth centuries.)

Running against the grain of this cultural movement to enclosure, the nineteenth century saw the circulating library become the norm — rather than libraries in which massive tomes were literally chained to desks. The interpretation of the word “open” to mean a shared resource to which all had access, fit neatly into the philosophy of the modern library movement of the nineteenth century. The phrases “open shelves” and “open stacks” emerged at this time, referring to resources that were directly available to library users, without necessarily requiring intervention by a librarian. Naturally, however, not all library resources were made openly available, nor are they even today. Furthermore, resources are made openly available with the understanding that, like Commons land, they must be shared: library resources have a due date.

The twentieth century saw an increase in the use of the word “open,” as well as a hint of the confusion that was to come about the interpretation of the word. The term “open society” was coined prior to World War I, to indicate a society tolerant of religious diversity. The “open skies” policy enables a nation to allow other nations’ commercial aviation to fly through its airspace — though, importantly, without giving up control of its airspace. The Open University was founded in the United Kingdom in 1969, to provide a university education to all, with no formal entry requirements. The meaning of the word “open” is quite different across these three terms — or perhaps it would be more accurate to say that these terms use different shadings of the word.

But it has been the twenty-first century that has seen the most dramatic increase in the number of terms that use “open.” The story of this explosion in the use of the word “open” begins, however, with a different word entirely: the word “free.”



## Speech, beer, and puppies

In 1983, Richard Stallman announced the GNU Project (a recursive acronym meaning GNU’s Not Unix), a “complete Unix-compatible software system,” which he announced he would give away for free (Free Software Foundation, 2014a). In 1985 Stallman founded the Free Software Foundation (FSF) to support the developing free software movement that coalesced around the GNU project. As Stallman himself discovered, however, “free” is itself an ambiguous word, and so the FSF found it necessary to define what it means for software to be free. According to the Free Software Definition, four essential freedoms must exist for users of free software:

- Freedom 0: The freedom to run the program as you wish, for any purpose.
- Freedom 1: The freedom to study how the program works, and change it so it does your computing as you wish.
- Freedom 2: The freedom to redistribute copies so you can help your neighbor.
- Freedom 3: The freedom to distribute copies of your modified versions to others.

The Free Software Definition defines the “free” in free software as being about liberty, not price: it is consistent with the principles of free software to sell copies. What makes software “nonfree” (proprietary) is if it restricts any of the four essential freedoms, thereby exerting control over the user. As Stallman writes, “you should think of ‘free’ as in ‘free speech,’ not as in ‘free beer.’” (Free Software Foundation, 2014b).

(Riffing on Stallman’s quote, some suggest that there is a third “free”: free as in puppies. This amusingly captures both the price meaning of free, as well as implying the costs of ongoing maintenance for the liberty meaning of free.)

The political philosophical stance articulated in the Free Software Definition was, according to Bruce Perens (1999), “very popular among the more liberal programmers,” but off-putting to business people. At least partly as a way to communicate “the pragmatic, business-case grounds” for free software, Perens and Eric Raymond coined the term “open source,” and founded the Open Source Initiative in 1998 (Open Source Initiative, 2012). Raymond had been involved in Netscape’s decision to open source their Web browser; as the project leader of the Debian GNU/Linux project, Perens had written the Debian Free Software Guidelines, based on the Free Software Definition. Perens went on to write the OSI’s Open Source Definition (Open Source Initiative, 2007), which specifies the

terms with which open source software must comply. Inevitably, some of these terms are similar to the Free Software Definition: specifically, that modification and redistribution of the software must be allowed. The Open Source Definition goes further, however, and specifies criteria intended to be friendlier to business interests: in particular, (1) that the software license applies “to all to whom the program is redistributed,” and (2) that the license may restrict the software from being distributed in modified form (provided that “patches” to the code are allowed).

The similarity between the Free Software Definition and the Open Source Definition has often led to the perception, outside of these communities, that differentiating between free software and open source software is a distinction without a difference. Within these communities, however, there has from the beginning been a tension between advocates of free and open source software. The term FOSS, for “free and open source software,” and even FLOSS, for “free/libre/open-source software” have emerged as ways to encompass all approaches to non-proprietary software. The term “software libre,” while less commonly used than either “open source software” or “free software,” is an attempt to clearly communicate “free as in free speech,” rather than gratis, which means “free as in beer.”

There is in fact not much about either free software or open source software that is truly free as in beer. The Open Source Definition states explicitly that software distribution “shall not require a royalty or other fee,” but the acquisition of the software is about the only thing that is gratis. Just as with proprietary software, there is a “total cost of ownership” of free and open source software, which includes such costs as development, customization, maintenance, hardware, support, and many others (Shaikh and Cornford, 2011; Silic, *et al.*, 2015). Thus, even though a distinction was articulated between libre and gratis, the term “free” remained too laden with connotations, making it difficult to repurpose as a technical term. Consequently, the term “open” has gained traction as the term “free” never did. To be fair, Peter Suber (2008) has argued that the word “open” is similarly laden, though perhaps less so. And perhaps the connotations of the word “open” are more pragmatic and less philosophically grounded. In any case, since the founding of the OSI, the term “open” has moved beyond software into other arenas, and a true explosion in the use of the word “open” has begun.



## Open means rights

The very idea of free software was, in large part, a reaction to a copyright regime that was perceived as being too restrictive. The Free Software Foundation therefore developed the idea of “copyleft,” which is “a general method for making a program (or other work) free” (Free Software Foundation, 2015), intended to be more robust than simply putting it in the public domain. To implement copyleft, the GNU General Public License (GPL) was developed in 1989 (Free Software Foundation, 2014c). The GPL grants users of software the four essential freedoms articulated by the FSF: the rights to run, study, modify, and distribute the software. Unfortunately, by engaging in wordplay, the term “copyleft” loses an important component of its meaning: the concept of legal *rights* is critical to understanding copyleft.

The “general method” of copyleft and the specifics of the GPL were a reaction to United States copyright law, and as a result they are based on the rights articulated in U.S. copyright law. The root of U.S. copyright law is articulated in the U.S. Code, Title 17, § 106, Exclusive rights in copyrighted works. According to this section, “the owner of copyright ... has the exclusive rights to do and to authorize any of the following”: to display, perform, reproduce, distribute copies of, and prepare derivative works based upon the copyrighted work (Cornell University Law School. Legal Information Institute, n.d.).

Another project that was a reaction to U.S. copyright law being too restrictive is Creative Commons (CC). Founded in 2001 and inspired in part by the GPL (Lessig, 2005a), Creative Commons has defined a set of licenses that provide alternatives to traditional copyright (Creative Commons, n.d.), not just for software but for all creative work. There are four rights articulated by Creative Commons licenses:

1. Attribution: All distributions of a work, and derivative works based upon it, must be credited to the creator of the work.
2. Non-commercial: Derivative work cannot be for commercial use.
3. Share-alike: Derivative work must be licensed under terms identical to those of the original work.
4. No Derivatives: A work may be redistributed, but only “unchanged and in whole;” no derivative works may be made based on it.

Two of these rights (Attribution and No Derivatives) are straight out of the U.S. Code. Importantly, of all the rights articulated in the U.S. Code, these are the only ones that may be reserved under a CC license. CC licenses give away all the other rights in the U.S. Code (display, performance,

reproduction, distribution): since the entire purpose of CC licenses is to enable the sharing and use of creative work, the assumption is that one wants to grant these rights, or one wouldn't be using a CC license in the first place. The other two rights articulated by CC licenses (Non-commercial and Share-alike) are restrictions to the first two rights, articulating what the user can or cannot do with derivative works. Share-alike is essentially the same as the concept of "Copyleft;" both restrict the future rights of others.

The U.S. Code § 106 addresses copyright, which generally refers to literary or other creative works. Most of the discussion and work around "openness" rests on copyright, and the presumption that the resource is such a creative work, as software is. Indeed, some definitions of "openness" make this explicit: according to the Open Content definition, for example, "the term 'open content' describes any copyrightable work" (opencontent.org, n.d.).

While this focus on copyright is common, however, it is not necessary; other types of intellectual property may also be open. Specifically, material objects that may be patentable, rather than copyrightable, may be open. The Open Design Definition, for example, was developed in 2000 by the Open Design Foundation for the world of manufacturing design (Open Design Foundation, 2000). This is, unsurprisingly, based on the Open Source Definition, only for physical artifacts or "embodiments," rather than code. There was inevitably cross pollination between the Open Source Software and Open Design movements, and what emerged was Open Source Hardware: technological, usually computerized artifacts, built using Open Design principles and licenses. In 2011 the Open Source Hardware Association developed its own Definition, also based on the Open Source Definition, which provides guidelines for licenses for manufactured "tangible artifacts" (Open Source Hardware Association, 2012).

Other definitions of "openness" are agnostic as to the nature of the intellectual property in question. The Open Knowledge Foundation's (OKF) Open Definition (n.d.a, version 1.0 published in 2007) articulates what openness means for data and content of all types. The Open Definition explicitly states that this meaning "matches that of 'open' with respect to software as in the Open Source Definition," as well as the meaning of "free" or "libre" as in the Definition of Free Cultural Works." The Definition of Free Cultural Works (Möller, 2015) itself is based on the Free Software Definition, an effort to define what "free content" means in the context of the Wikimedia project (version 1.0 published in 2008). The Definition of Free Cultural Works identifies four "essential freedoms" that must exist for users of cultural works, the same as those for users of free software: the freedom to use, to study, to redistribute copies of, and to make changes to the work. Both the OKF's Open Definition and the Definition of Free Cultural Works are broader than either the Open Source or Free Software Definitions, however, in that they refer explicitly to patents, in addition to copyright.

Communities such as manufacturing design and hardware — in other words, those working with technological artifacts — developed Definitions based on the Open Source Definition. Communities working with more abstract resources developed Definitions based on the Open Knowledge Foundation's Open Definition. (Though to be fair, the OKF's Open Definition is in turn based on the Open Source Definition.)

The freedom of free software, and the openness of open source software, are fundamentally legal rights: one can run a piece of software, redistribute it, access the source code, etc., because the owner of the copyright on a piece of software has used a license that articulates the rights granted to a user of that software (Free Software Foundation, 2016; Open Source Initiative, n.d.a). The Free Software Definition and the Open Source Definition are translations, so to speak, of these rights into non-legalese.



## Open means access

Arguably the most important of these rights is access, since without access to the software or other creative work, it is not possible to exercise any other right. Both the Free Software Definition and the Open Source Definition state this explicitly. Freedom 1 was abbreviated above, but the full text reads as follows: "The freedom to study how the program works, and change it so it does your computing as you wish. Access to the source code is a precondition for this." The very Introduction of the Open Source Definition states that "open source doesn't just mean access to the source code," it requires compliance with a number of other criteria ... which implies that access to the source code is a necessary precondition for those other criteria.

The right of access is so fundamental to openness that it is a category unto itself: Open Access (OA). In 2002 the Budapest Open Access Initiative issued the first formal declaration on OA: referring specifically to scholarly literature, OA is defined as "its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from

gaining access to the internet itself" (Budapest Open Access Initiative, 2002).

While the BOAI has been especially influential, Suber (2012) points to two other statements on OA as well: the Bethesda Statement on Open Access Publishing (2003), and the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (2003). The Bethesda Statement, like the BOAI declaration, promotes OA for scientific literature, though with a narrower focus on biomedical research specifically. The Berlin Declaration was written to promote OA for scientific knowledge and cultural heritage broadly, and so includes not only scholarly literature, but also data, metadata, source materials, and multimedia material.

All three of these statements (what Suber refers to as "the BBB definition of OA" [1]) emphasize both meanings of "free": libre and gratis, free as in speech and free as in beer. All three statements also emphasize the availability of materials online. The BOAI declaration states that OA means "free availability on the public internet," and the Bethesda and Berlin statements state, in almost identical language, that a work is OA if it meets two criteria, one of which is that it is deposited "in at least one online repository." Availability on the "public internet" is central to what it means for a resource to be OA: not only must it be online, but it must be public, it cannot be behind a paywall or login or have other barriers to use. (The Open Source Definition predates the BBB statements, but it too contains similar language: the means for obtaining source code is "preferably, downloading via the Internet." Many other Open Definitions, being based on the Open Source Definition, include not just this same idea but even the same wording.)

Suber suggests that OA removes two types of barriers: price and permission. This is an important point, because these are far from the only barriers to access. Suber lists four types of barriers that may remain in place even if price and permission barriers have been removed: censorship, language, handicap access, and connectivity [2]. Open Access does not directly address any of these barriers. However, having resources available online for free (gratis) is certainly closer to the ideal of universal access than not. Open does not mean friction-free, it just means with as little friction as possible.

As one of the oldest "opens," the Open Access movement's focus on written scholarly literature has opened up a niche for other "opens." One of the most significant of these is Open Data. The Berlin Declaration states explicitly that OA resources may include "raw data and metadata," though by and large OA is concerned not with data, but with the publications based on that data. However, data is as much a product of scholarship as publications, and there is an increasing sentiment among scholars that it should therefore be made public (Borgman, 2015). The Open Data Handbook defines what "open" means in the context of data, and unsurprisingly, "Availability and Access" are the very first criteria (Open Knowledge, n.d.b). Journal publishers — particularly publishers of OA journals — are increasingly requiring that datasets be made available alongside articles. The Public Library of Science (PLOS), for example, has a policy that requires authors "to make all data underlying the findings described in their manuscript fully available without restriction," with refusal to do so being grounds for rejection of a manuscript (PLOS, n.d.a). Importantly, PLOS positions this Data Availability policy as being a natural extension of OA publishing.

Scholarship has always been an open process; the idea of open science dates back to the very origin of modern science, and arguably even prior to that (Borgman, 2010). One of the foundations of the scientific method is that all work must be reproducible, and the only way for that to happen is if all processes are performed openly. The Open Science movement is therefore predicated on the idea that "full access to the major components of scientific research" is necessary (Hanwell, n.d.). This is necessary because more and more science is being done digitally, and therefore access to code has become as critical to reproducibility as access to methodology has always been. Furthermore, only by providing access to all processes — methodology (Kraker, *et al.*, 2011), data, publications, peer review, even informal lab notebooks (Open Notebook Science Network, n.d.) — can modern science be true to the core values of the scientific enterprise.

Indeed, not just science, but culture in general has always been open. The legal scholar Lessig documents the expansion of copyright under U.S. law over the past 40 years. Lessig (2005b) argues that this expansion, far from promoting "the Progress of Science and useful Arts" (as specified in the U.S. Constitution, Article I, Section 8), actively inhibits it, and that the modern U.S. is becoming a "permissions culture" rather than a "free culture": in other words, that the default legal position is that one must gain permission to make use of a creative work, rather than the default being that one is free to do so. This definition of "free culture" harks deliberately back to Stallman's definition of free as in "free speech": Lessig's argument is that the progress of science and useful arts is best promoted when individuals have greater freedom to create derivative works, and that less freedom leads to a stifling of progress. Henry Jenkins arrives at a similar position, coming from a different direction. Jenkins, not a lawyer but a media scholar, uses a different, though related, set of terms that reflect this focus on the production of cultural artifacts. Jenkins (2008) proposes several literacies for involvement in "participatory culture," including Appropriation: "the ability to meaningfully sample and remix media content." Jenkins, *et al.* (2009) argue that much of what we consider received culture is the product of appropriation and remixing, from the *Iliad* to Lewis Carroll. In short, Jenkins' argument is that cultural progress is necessarily the result of freedom.

In this vein, the OpenGLAM initiative (GLAM is an acronym for Galleries, Libraries, Archives, and Museums) has developed a set of Principles that articulates what openness means in the context of cultural heritage (OpenGLAM, n.d.). What is unusual about the OpenGLAM initiative, however, is that it does not seek to provide access to the actual artifacts in the collections of cultural heritage institutions. This sets the OpenGLAM initiative's goals apart from the other projects discussed in this section, but makes perfect sense when you consider that many or most of these artifacts are one-of-a-kind, and it would be impractical and undesirable to make access to them open, in the way that access to scholarly publications can be. Instead, the OpenGLAM initiative seeks to open the collections of cultural heritage institutions by providing access to digital representations of the artifacts in them, and metadata about these artifacts. These representations and metadata, however, are accessible, and may be used freely — “freely” meaning both *libre* and *gratis*.



## Open means use

If access is the most important of the rights granted by licenses, the right without which nothing else matters, then surely the second most important right is use. It is all well and good to have access to a resource, but if one cannot then make use of that resource, it is all for naught. Indeed, use is implied by access, since what is access to a piece of software if it cannot be run? What is access to a publication if it cannot be read? “Use” is, however, an extremely broad term. To use a piece of software may mean to run it, but may also mean to study it, change it, or distribute it. To use a publication may mean to read it, but may also mean to cite it or republish it.

The idea of use is so deeply rooted in the Free Software Definition that it is never even mentioned in the four essential freedoms. Instead, specific categories of use are articulated: to run, to study, to change, and to distribute a program. Similarly with the Open Source Definition: use is never mentioned except to state that it cannot be restricted. Indeed, few definitions explicitly mention use, preferring to spell out specific categories of uses. The Open Content definition, for example, articulates “the 5R activities”: Retain, Reuse, Revise, Remix, and Redistribute (opencontent.org, n.d.). Specific uses are listed for each of these; download, duplicate, store, and manage, for example, are all provided as examples of Retain. Similarly, Creative Commons assumes the freedom of use. But of the four rights articulated in Creative Commons licenses, three are uses that may be restricted: creating derivative works, distributing derivative works commercially, and distributing derivative works under terms different from those of the original work.

These examples illustrate that if a work is open, then the right of use is assumed. The fact that definitions of openness must explicitly spell out *restricted* uses makes it clear that if a work is open, then any and all of the things that it may be possible to do with it are allowed, unless explicitly disallowed.

A field with an especially broad definition of “use” is education. Unsurprisingly, there are a number of types of openness around education. The Open Education Consortium defines open education as “resources, tools and practices that employ a framework of open sharing to improve educational access and effectiveness worldwide” (Open Education Consortium, n.d.), while the Cape Town Open Education Declaration (n.d.) declares that the promise of open education is that “each and every person on earth can access and contribute to the sum of all human knowledge.” Once again, access to resources, followed immediately by use, is at the heart of what openness means in this context.

Perhaps the most important type of resource produced by and for education are learning objects: materials “designed and produced in such a manner as to be reused easily in a variety of pedagogical situations” (Centre for Educational Research and Innovation, 2006). Naturally some of these materials have been made open: the Open Education Consortium, for example, argues that “sharing is probably the most basic characteristic of education: education is sharing knowledge, insights and information with others, upon which new knowledge, skills, ideas and understanding can be built” (Open Education Consortium, n.d.). Materials that are shared in this way are referred to as Open Educational Resources (OER), which, according to the OER Commons, are “teaching and learning materials that you may freely use and reuse at no cost” (Open Educational Resources (OER), n.d.). OER may be either digital or analog, and may be anything from lesson plans and classroom activities to semester-long course syllabi to entire textbooks. The OER Commons also states that OER are often made available under a license that articulates “how the material may be used, reused, adapted, and shared.”

One type of OER is open courseware. Perhaps the best-known open courseware initiative is the Massachusetts Institute of Technology (MIT) OpenCourseWare (OCW) project, though this is far from the only one; as of this writing the Open Education Consortium has nearly 250 member institutions. The MIT OCW project “makes the materials used in the teaching of almost all of MIT’s subjects available on the Web, free of charge” (MIT, n.d.). The Open Education Consortium (n.d.) argues that open sharing in education “allows not just access, but the ability to modify and use materials.”

Currently one of the best-known forms of open education is the MOOC, the Massive Open Online Course. This term was first applied to a course called Connectivism and Connective Knowledge, taught by George Siemens and Stephen Downes in 2008 (Parry, 2010). That course, as the name would suggest, was designed as a constructivist learning environment: the course description stated that it “does not consist of a body of content you are supposed to remember. Rather, the learning in the course results from the activities you undertake, and will be different for each person” (Siemens and Downes, 2011). In other words, this first MOOC was open in the sense articulated by the Open Education Consortium: knowledge, insights, and information were shared between students, and new knowledge, skills, ideas, and understanding built through sharing. This is perhaps the purest form of open education, in which the instructor is a facilitator, and the students collaborate to create a shared understanding. A MOOC of this stripe is now more commonly referred to as a cMOOC, to differentiate it from an xMOOC, which has a more traditional course structure (Yuan, *et al.*, 2014). Several providers of xMOOCs have been launched in recent years, three having emerged as the major players in this space: edX, Coursera, and Udacity. The courses offered by these providers are generally four to twelve weeks long, composed of video content and regularly scheduled assignments. In other words, these are fairly traditional lecture-style courses, online. These courses are open only in the sense that enrollment is free: an xMOOC is gratis, but not in any way libre, as students cannot modify and reuse the course materials, or even necessarily gain access to them after the course is over.

Other providers of open courses offer perhaps a purer form of open education, where access and use even extends beyond resources, to institutions. The Open University (OU) was established in the U.K. in 1969 to broaden access to educational opportunity. The OU is open in the sense that the courses offered are accessible to all: according to the OU’s mission statement, “most of our undergraduate courses have no formal entry requirements” (Open University, 2016). Since 1969, many other open universities have been founded around the world, with similar missions. As discussed above, the term “Open Access” has a very specific meaning, but open education and open educational institutions such as the OU are certainly concerned with access: access to resources and access to opportunity. This access may be meaningless, however, without the support structures provided by an institution to students. “Use” is a broad term, but in the context of software and publications and learning objects, is used to mean manipulating artifacts. Education, however, is not just about artifacts, not just about access to books and articles, not just about reuse of lesson plans. Education is also about advising and support, the sorts of services that are used at some point by every student affiliated with an institution of higher education. First generation college students, in particular, have a need for these kinds of support services, as they might not have access to that expertise elsewhere in their lives; use of these services at an institution dramatically increases first-generation and at-risk students’ graduation rates (Rine and Eliason, 2015; Engle and Tinto, 2008). As the OU’s mission statement makes clear, the underlying philosophy of open education equates access to educational opportunity with social justice.



## Open means transparent

The Debian community was perhaps the first to explicitly equate free software with social justice, by subsuming their Free Software Guidelines under the Debian Social Contract (Perens, 2004). But freedom has always been equated with a social contract, at least since the U.S. *Declaration of Independence*. This view of government “of the people, by the people, for the people” (Lincoln, 1863) is naturally aligned philosophically with openness.

Karl Popper’s *The open society and its enemies* (Popper, 2013) refers to a (hypothetical) government that is wholly accountable and responsive to its citizens, and in which political decision-making is entirely transparent. Taking his cue from Popper, George Soros in 1993 founded the Open Society Institute (which in 2010 changed its name to the Open Society Foundations, <http://www.opensocietyfoundations.org/>), an organization whose mission is to build “societies whose governments are accountable and open to the participation of all people.” To that end, in 2001 the Open Society Institute funded the meeting at which the Budapest Open Access Initiative declaration was created (Poynder, 2002). David Brin (1998) extends Popper’s thesis to include not only governmental but also individual transparency. A society is more than its government, however, and even more than its citizens, which is why Popper and the Open Society Foundations both encompass a broader view of what constitutes society. The term “open government” has consequently come into existence, in part to clarify this distinction.

President Obama’s (2009) “Transparency and open government: Memorandum for the heads of executive departments and agencies,” is a statement of principles: “My Administration is committed to creating an unprecedented level of openness in Government. We will work together to ensure the public trust and establish a system of transparency, public participation, and collaboration.” One of the upshots of transparency in government is access to the products and artifacts created by the government: for example, to datasets. This memorandum launched the Open Government Initiative

(Open Government Initiative, n.d.), under which falls, among other things, the Web site data.gov (<http://www.data.gov/>). This site is “the home of the U.S. Government’s open data,” the purpose of which is to increase public access to datasets generated by the U.S. government. Data.gov not only allows, but actively encourages, the public to create derivative works, in the form of applications that make use of accessible datasets. Indeed, even the software on which the site is running is open source.

The problem with defining openness as transparency, at least in the context of government, is that certain parts of government operation will never be completely transparent, nor, arguably, should it be. The U.S. decennial census, for example, is transparent in almost every way that’s meaningful: the data collection instrument is openly accessible, as are all publications about the census, the methodology is open, and the data that the census produces is made available (<http://www.census.gov/>). The Census Bureau even provides open education opportunities. However, it would not be possible for you or I to accompany a census taker on their door-to-door rounds, nor should it be. For another example: as of this writing, data.gov (<http://www.data.gov/>) contains almost 200,000 datasets, from hundreds of agencies and departments. None of these, however, is from the Central Intelligence Agency, which by its very nature can never be entirely transparent.



### Open means participatory

The 2009 “Memorandum on Transparency and Open Government” emphasizes transparency, participation, and collaboration. Much of the emphasis of open government is on transparency, but information about what the government is doing is meaningless without the ability for citizens to then act on that information to exert influence on the government. This, of course, is almost a definition of participatory democracy.

Most modern democracies — including the U.S. — are not truly participatory, but rather are representative democracies. In a representative democracy, of course, citizens elect representatives to participate in government on their behalf, which includes the development of law and policy. Given the ubiquity and ease of use of technology to enable collaboration, however, Rushkoff (2003) has proposed “open source democracy”: a model of participatory democracy based on the governance of the open source software community. The term “open source democracy” is nonsensical, really, since democracy does not have source code, and anything that may metaphorically be considered to be source code (for example, the U.S. Constitution and the Bill of Rights) are already in the public domain. What is confusing is that the term “open source democracy” — also referred to as “open source governance” — does not refer to the rights of access and use of government. Rather, these terms refer to a consequence of the rights of access and use: the possibility for anyone to participate in the processes of government.

Open source democracy, therefore, is a model of government in which citizens have an active hand in the development of law and policy. In that vein, another part of the U.S. federal government’s Open Government Initiative is We the People (<https://petitions.whitehouse.gov/>), which enables anyone to start a petition, and if it receives enough signatures, “it will be reviewed by the Administration and we will issue a response.” This type of participation in lawmaking is being tried at many levels of government, from the federal to the local (Goldsworthy, 2015).

The case for open government has been made on both sides of the Atlantic. The Digital Agenda for Europe makes a statement about capabilities: An open approach enables government agencies “to be more transparent, more accountable, and more agile” (European Commission, 2015b). The Digital Agenda for Europe explicitly links open government with information and communication technology (ICT), so that the focus of the European agenda is actually on “eGovernment” (European Commission, 2015a). In this way, the European Commission is acknowledging a fact about open government that is inherent in open access and open source: that openness depends on computing and networking.

Which brings us back to open source software. Freedom 1 of the Free Software Definition is “The freedom to study how the program works, and change it so it does your computing as you wish.” This freedom implies that anyone can do that studying and changing; anyone can participate in the community of free software development. This notion of open participation is embedded in the Open Source Initiative as well: “the pragmatic, business-case grounds” for the open development of software mentioned above was based on the idea that source code can be created and improved “by participating in an engaged community” of developers (Open Source Initiative, 2012). Open source implies access to and use of software, but that access and use is only valuable in the short term. In the long term, software must change so that bugs will be fixed, new functionality will be added, new hardware platforms accommodated, etc. In the long term, access and use of open source software is only valuable if there is an engaged community of developers.



Indeed, this is one of the most significant hurdles to the sustainability of open source projects. Anyone can develop a piece of software and license it as open source, but there are few Linuxes out there. By one estimate, only 17 percent of open source projects are sustained over time (Schweik and English, 2012). There are, of course, a variety of reasons why an open source project may fail. But chief among these is the fact that there is a finite number of developers in the world with the skillset to contribute to such projects. Open source may mean the freedom to change the software, but this is only true in theory; in practice, the bar to participating in the open source community is high, as one needs a high level of programming skill to meaningfully contribute. The same is true of any open community. Even making a publication open access is not a simple matter: the bar to licensing a copyrighted work as open access is knowledge of how to navigate copyright law. This should not be true for open source democracy, however, which should be sufficiently open for all citizens to participate. Even Rushkoff acknowledges, however, that education is a necessary precondition for understanding existing social structures, and engaging in their revision. Even open source democracy has a bar to entry. The Creative Commons, mentioned above, has developed a set of licenses, and an online tool to help a user navigate through the set of decisions around which rights to keep and which to provide to the user. By creating this educational resource, Creative Commons has very effectively lowered the bar to participation in the open source community. Similarly, open government can only be fully realized through open education.



### Open means enabling openness

Creative Commons did not develop the Free Software Definition or the Open Source Definition, or indeed any definition of what it means for particular types of resources to be open. Instead, Creative Commons developed a set of licenses and an online tool to help with using these licenses. In so doing, Creative Commons became a very powerful enabler of openness.

Acting as an enabler of openness is another meaning of the term “open,” and one that is somewhat more oblique than those that have been discussed so far. “Open” in this sense does not, like open source or open access, refer to a specific type of resource. Rather, it refers to a set of affordances (Gibson, 2014), either technical or legal, for a specific type of resource, of which a user may make use.

This legal affordance is built into the Open Source Definition: licensing software as open source requires that derivative works must be “distributed under the same terms as the license of the original software.” This legal affordance is likewise built into the Creative Commons ShareAlike license. Open source software enables the existence of future open source software.

Tim Berners-Lee (2010) makes the case that this form of openness is key to the value of the Web: specifically, that open standards enable innovation. Many standards are open in the sense of open access: they are publicly available online, gratis. But the World Wide Web Consortium (W3C), in their Definition of Open Standards (Dardailler, 2007), takes this further. Using the W3C process for standards development additionally requires that a standard be open in the sense of open government: the development process is transparent, and anyone may participate. The W3C, along with several other organizations involved in managing the infrastructure of the Internet, created OpenStand, which has articulated a “modern paradigm for standards,” published (open access, of course) as a set of principles (OpenStand, n.d.b). OpenStand’s goal in developing these principles is to create “global markets, fostering job creation and economic opportunity and yielding better products,” and in so doing, “bringing about the world that humanity desires” (OpenStand, n.d.a). OpenStand is very explicit that open standards, by enabling openness for other types of resources, are socially beneficial.

The cultural heritage sector is usually far afield from standards development, but is equally motivated by social benefit. One mechanism by which the OpenGLAM initiative, discussed earlier, attempts to promote the social benefit of galleries, libraries, archives, and museums is by making use of open standards. According to Heath and Bizer (2011), “Linked Data refers to a set of best practices for publishing and interlinking structured data on the Web.” These best practices are recommendations from the W3C (Jacobs and Walsh, 2004), but given that they’re from the W3C, have over time become de facto standards. Put simply, Linked Data makes use of the architecture of the Web to enable the development of interconnected datasets on the Web.

The OpenGLAM initiative leverages Linked Open Data — which, confusingly, is not the same as the Open Data discussed earlier. The *Open Data Handbook* (<http://opendatahandbook.org/>) defines “data” as a large dataset (as opposed to a single datapoint, which it defines as “content”). Linked Open Data, on the other hand, is a subset of Linked Data. Not all Linked Data need be open, and not all Open Data need be linked. What makes Linked Open Data open is its use of open standards in structuring the data, and in creating links.

It is this openness that Berners-Lee argues is key to the value of the Web. The open standards

movement is based on the idea that openness, in all the forms discussed above, is socially beneficial; enabling openness is therefore itself socially beneficial. OpenStand literally argues that open standards make the world a better place.



## Open means philosophically aligned with open principles

Richard Stallman first articulated the notion of “free as in beer.” Riffing on this, several breweries have developed “open source beer” (Hibbets, 2010; Stuart, 2014; Wagstaff, 2014). Perhaps the oldest such project is the Free Beer project (Free Beer Foundation, n.d.), which applies “free software/open source methods to a traditional real-world product,” by being licensed under a Creative Commons Attribution-ShareAlike license. In other words, “Free Beer” is both libre and gratis: it is free as in freedom, as well as being literally free as in beer.

“Free Beer” is merely the opening gambit in the silliness around openness. The OpenCola project actually predates “Free Beer”, and is, as you might expect, a cola recipe, licensed under a GNU General Public License (OpenCola.com, 2001). “Free Beer” and OpenCola are licensed so as to be consistent with the four essential freedoms of the Free Software Definition: anyone can make “Free Beer” or OpenCola, and can modify the recipe. While clearly a gimmick, this is at least consistent with some of the meanings of “open” discussed above: “Free Beer” and OpenCola are openly accessible (though, to be fair, so are many copyrighted recipes online), and may be used and modified for free.

The Open Source Seed Initiative (OSSI) is not at all a gimmick: founded in response to the increasing number of patented seeds, the OSSI is dedicated to promoting open source principles among plant breeders (Open Source Seed Initiative, 2016). Instead of licensing seeds under any of the licenses discussed above, however, the OSSI simply recommends that plant breeders make a Pledge, which contains provisions similar to these licenses. This is similar to Open Design and Open Source Hardware, with their focus on physical artifacts that might otherwise be patented. By not using a Creative Commons or other license, however, the OSSI Pledge has no legal teeth.

From there, the use of the word “open” starts to get even fuzzier. The Open Recipes project (Fictive Kin, 2013), for example, is not a database of open recipes, but rather an open database of recipes: in other words, the database itself is built using open technologies, but that database may contain copyrighted recipes. Similarly, OpenFarm is an open database of farming and gardening information (OpenFarm, n.d.). (To be fair, OpenFarm also publishes their expenditures and revenues openly, as discussed for open government data.) The Open Food Network (2015) is a non-profit organization that has developed an online marketplace to connect people with local farmers; this marketplace was built using open source software. The Open Ag Data Alliance (2014) is an initiative to increase data interoperability in farming, by developing tools for data sharing that are built on open source software. In a similar vein, Open Source Beehives is a project to use open source hardware — specifically, sensors of various types, such as for temperature and humidity — to monitor beehives and track the health of bee populations (Open Source Beehives, n.d.).

All of these projects are certainly worthwhile, but they use the term “open” quite loosely. “Open source software” means that the software itself is open source; “Open data” means that the data itself is open; “Open hardware” means that the design documents for the hardware are openly accessible. But it is not the beehives that are open, it’s the sensors in the beehives. It’s not the recipes that are open, it’s the database in which they’re stored. It’s not the food that’s open, it’s the hardware and software used by the farmers and others along the production and distribution chain for the food. In other words, “open” is being used here not to indicate the resource itself, but rather to indicate the nature of the tools used to build the resource, or by which resources are provided.

The one exception to this is Open Source Ecology (n.d.). This is a multi-disciplinary collaboration to use open design principles to develop a set of the most important machines required by modern life: tractor, oven, rotor, truck, etc. This project makes use of open hardware and open design principles to develop these machines. But it then also makes the blueprints for these machines available under an open license. “Open” here does in fact indicate that a type of resource is being provided ... but the use of the word “open” is still somewhat misleading: it’s not ecology that’s being provided via an open license.

The Open Source Ecology project has significant community involvement by machine designers. The term “open source” is increasingly being used to indicate this type of community involvement, even when there is no software in sight. Which brings us to what may be the silliest of all uses of the word “open”: Open source religion. Yoism (<http://www.yoism.org/>) enables anyone to participate in the refinement of a belief system and holy text, motivated by the idea that the “true” nature of reality can only be approached through this sort of crowdsourced truth-seeking. To be fair, though, “crowdsourced truth-seeking” is not a half bad description of the enterprise of science itself.

## Openwashing and its discontents

While these projects use the term “open” loosely, which may lead to ambiguity and confusion, at least they use the term in good faith. The same cannot be said of some uses of the term “open.” The term “openwashing” was coined to mean: “to spin a product or company as open, although it is not” (Thorne, 2009).

Examples of openwashing abound. Ulander (2012) criticized Sun Microsystems, Inc. for “open sourcing a technology, but maintaining complete ownership of the project direction and copyrights.” Finley (2011) levels a similar criticism at Eucalyptus Systems. Winer (2009) criticized the *Guardian* for making data available via an API, but not allowing its reuse. Wiley (2011) criticized the company Open Education Solutions for using the term when in fact open educational resources are only a very small part of the service provided. Villum (2014) criticized the company OpenCorporates for making data available only insofar as it “strengthens their opportunity to offer consultancy services.” Indeed, openwashing (or at least the perception of openwashing) is as old as open source software: the Free Software Foundation criticized Netscape, one of the very first pieces of commercial software ever to be open sourced, for use of a license containing terms unfavorable to contributors (Free Software Foundation, 2016).

In addition to the bile being vented in the blogosphere, many open communities have responded to openwashing with more rigorous definitions of what “open” means. The Open Source Initiative has developed the Open Standards Requirement for Software (Open Source Initiative, n.d.b), a set of criteria with which open standards must comply, so as not to discriminate against open source developers. PLOS (Public Library of Science) has developed the “HowOpenIsIt?” Open Access Spectrum, “to enable users to compare and contrast publications and policies” across a set of criteria (Public Library of Science, n.d.b). In 2014 the *Directory of Open Access Journals (DOAJ)* required all publishers of journals listed in the directory to reapply under a stricter set of criteria, in part to “weed out questionable journals” (Mitchell, 2015). Building on the *DOAJ* criteria, Graziotin, *et al.* (2014) have developed a “framework for systematically analyzing open access journals” to identify which of a set of core open access attributes a journal possesses. The Apereo Foundation, which has supported several open source and open education projects, has developed an Openness Index to “assess the openness of the organization/community that creates and manages” open artifacts (Masson and Udas, 2013). The Open Knowledge Foundation’s Open Definition, discussed earlier, “makes precise the meaning of ‘open’ with respect to knowledge,” and has undergone several revisions to ensure this precision.

Thorne, who is credited with coining the term, suggests that “openwashing is a side effect of customers’ growing desire to have transparency and access in their services,” and that the more companies engage in it, “the greater the weight they’re indirectly giving these issues.” Other authors take an even stronger stance: Finley, for example, states flat out that “the old ‘open vs. proprietary’ debate is over and open won.” It’s not clear just what “winning” means in this context, as proprietary software still exists, and probably will for a long time to come. However, the very fact that some companies believe that it is a competitive advantage to present their products as open (truthfully or not), indicates that there is a significant market niche for openness.

Instead of devaluing the term “open,” openwashing may therefore actually be doing it a favor. As more products and resources are referred to as open, it raises awareness of the term. As the term is used more — sometimes loosely or even inaccurately — communities of interest develop stricter criteria for what it means for a resource to be open. As the term “open” is applied to more and more types of resources, the definitions for what the term means in those contexts become more and more precise. To use an evolutionary metaphor, we are currently seeing the term “open” undergoing speciation, as it is applied in new niches. As criteria are refined over time, the various species of openness are becoming increasingly well-defined. These different uses of the term “open” in different niches are not isolated from one another, however; there is considerable overlap, dictated by the use of open licenses.

## Conclusion

An evolutionary metaphor would probably work for tracing the development of any word, but it works especially well for the word “open.” The use of the word “open” to mean a shared resource to which all have access is centuries old. The explosion in variations of this meaning of the word can be traced to communities of software developers reacting to aspects of U.S. copyright law that was seen to be inapplicable to software. This community first used the word “free” to describe their software, but that word was too heavily laden with connotations to be repurposed. As a result, the

term “open” was adopted to describe this software; a terminological “horizontal gene transfer” (Amábile-Cuevas and Chicurel, 1993), as it were.


From the common ancestor Free Software, the term “open” diversified, filling a wide range of niches. The Open Source Definition gave rise to a number of other definitions, articulating openness for everything from hardware to knowledge. Inspired by the political philosophy of openness, the Open Society Institute funded the meeting at which the Budapest Open Access Initiative declaration was created. Open Access then gave rise to a wide range of other opens concerned with scholarship, publication, and cultural heritage generally. This spread of openness can be seen as the diversification of a powerful idea into a wide range of resources and services. It can also be seen more importantly as the arrival, society-wide, of an idea whose time has come ... an idea with political, legal, and cultural impacts.

There is a crucial distinction to be made between a resource being shared, and being truly open. That difference lies in the use of an open license. This essay is not a legal analysis of open licenses; there is already a significant literature that performs that function (for example, Guibault and Angelopoulos, 2011; Liang, 2004). Rather, this essay is an effort to identify the many meanings of the word “open” as it is used in ordinary language and in what are called “phraseological neologisms” (new phrases, rather than new words). By our count, this essay includes more than 30 phrases that make use of the word “open.” While this is somewhat less than the 50 promised in the title, it is also by no means an exhaustive list: we did not discuss, for example, the Open Source Washing Machine Project (not to be confused with openwashing), as that is simply one example of an open hardware project (<http://www.oswash.org/>). We also did not discuss “open housing” (now more commonly referred to as “fair housing”), as that is simply one example of the same access and equity issues around Open Government, discussed earlier. Nor do our 30-plus “opens” count the phrases that use the word “free” to indicate something similar to “open.”

The word “open” is used to indicate that a resource is accessible for no monetary cost. The word “open” is used to indicate that a resource may be used in any way imaginable. The word “open” is used to indicate that anyone may use a resource. The word “open” is used to indicate that anyone may join in a process. The word “open” is used to indicate that artifacts of a process are accessible. The word “open” is used to indicate that a process leads to the creation of resources that are accessible and may be used in any way imaginable. The word “open” is used to indicate that a resource was created by using other open resources.

Openness breeds more openness. This is probably in part because everyone likes free things — free as in gratis. Of course openness is not free: open source software and open access publishing, for example, have costs, though these may be in different parts of the resource’s lifecycle than commercial software and publishing. But more importantly, this is because openness means libre: the freedom of free software, free as in free speech. The user of an open resource is free to do with it what they like, which may include creating a new resource, which another user may be free to do with what they like, etc. Openness creates a virtuous cycle.

It is because of this virtuous cycle that we wrote this essay. Both the number of open source software projects (Schweik and English, 2012) and the number of open access publications (Archambault, *et al.*, 2014) have been increasing for two decades. As the number of open resources of all types increases, the more open resources will be created using them and derived from them, and the more open resources there will be. This snowballing growth of openness is socially beneficial, and, we believe, will make the world a better place.

The one downside, however, is this: as openness increasingly comes to be the norm, more phraseological neologisms will be coined using the word “open.” As the word “open” is used more, it will inevitably be used in new, and sometimes confusing, ways. Ambiguity leads to misinterpretation. This essay is an attempt to disambiguate the many meanings of the word “open.” Hopefully this essay has clarified the current state of affairs with regard to the use of this word. Also hopefully, as new uses of the word “open” are coined, their coiners will be clear about just which shade of open is meant. However, this essay is probably only the opening gambit in attempts to disambiguate this term. We have merely opened the door on the many uses of the word “open;” as the use of the word grows, others must opine. 

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**Robin Peek** was an early and long-time supporter of open access, and the Editor and co-founder of the *Open Access Directory*. She was a professor in the Simmons College Graduate School of Library and Information Science for more than 20 years, and taught one of the first ever courses on open access. She was also a columnist on publishing for 15 years at *Information Today*. Robin retired at the end of the 2013–14 academic year, though she remained an active scholar. She died on 21 August 2015.

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## Notes

1. Suber, 2012, p. 7.

2. Suber, 2012, pp. 26–27.

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