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## Openness

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**Abstract:** The nature and extent of openness depend on the context and/or disciplinary domain. Earlier usage of the term open was in the context of computer systems. For example, in networked systems of computers, 'openness' refers to enabling protocols that connect previously closed systems so that they can communicate with each other. Beyond that, openness has been used to imply a spectrum of meanings, notably since the campaign for open source software development populated the term 'open' and its suggested notions of 'openness' as freedom, entitlement, or norm. As a social form of organising, 'openness' suggests a way of sharing resources. In the corporate context, 'openness' refers to more active involvement of stakeholders in the process of value creation.

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## Definition

Openness is contextual. Openness implies access to resources that are otherwise closed or restricted in degrees; it can also refer to a more participatory mode of production.

## Introduction

The nature and extent of openness depend on the context and/or disciplinary domain. Earlier usage of the term open was in the context of computer systems. For example, in networked systems of computers, 'openness' refers to enabling protocols that connect previously closed systems so that they can communicate with each other. Beyond that, openness has been used to imply a spectrum of meanings, notably since the campaign for open source software development populated the term 'open' and its suggested notions of 'openness' as freedom, entitlement, or norm. As a social form of organising, 'openness' suggests a way of sharing resources. In the corporate context, 'openness' refers to more active involvement of stakeholders in the process of value creation.

## Coexisting uses and meanings

In the 1980s, Open Systems Interconnection (OSI) released the OSI Reference Model, a set of standards for independent but interoperable computer networks (ISO, n.d.; Russell, 2013). This seven-layered network model offers a set of protocols for communication on and in between the layers. Openness, as in this OSI model, refers to the capability of working with "black box" systems of different vendors in the network. Such a model may be deemed open in the sense that it not only connects closed systems but it also remains vendor-neutral.

To achieve interoperability, information systems must follow formalised standard specifications. An open standard is one such specification that is freely and publicly available for all to implement. According to the Open Source Initiative, an open standard must be detailed enough to allow interoperable implementations. As per the World Wide Web Consortium (W3C, 2007), the development of the specification must be transparent, open, and impartial. Open here means that anybody can participate. These requirements are also found in "The Modern Paradigm for

Standards” (OpenStand, n.d.), a joint statement affirmed by the Internet Society, Internet Engineering Task Force (IETF), Internet Architecture Board (IAB), W3C, and the IEEE Standards Association. Furthermore, all essential patents that are open must be licenced royalty-free or be covered by a promise of non-assertion when practiced by open source software (Open Source Initiative, 2006).

When a computer system’s internal operation is not revealed to the outside, even though others may still interoperate with it, it is a closed system. When the software operating a computer system is publicly made available in a source code format, it is open source software. In the 1970s, source code was openly shared without much restriction until corporate entities started restricting redistribution of the source code of their products. In response, libre software and open source development emerged in the 1980s and 1990s to ensure that source code sharing remained a viable common practice. The Free Software Foundation and the Open Source Initiative were the key actors. The Free Software Foundation, by using the GNU General Public License, emphasises the freedoms the users must have in using their software, including the right to distribute, modify, and re-distribute the source code of the software and its modification (Free Software Foundation, 2007; 2021). The Open Source Initiative (2007) developed and released the Open Source Definition to establish a set of criteria that must be met before a software package can be called open source. The Open Source Initiative maintains a list of software licences conforming to the Open Source Definition. These are the open source licences recognised by the open source community at large.

Other public licences have also been devised to facilitate sharing. For example, open content licences have been applied to creative works that may be subject to copyrights and/or *sui generis* database rights. Examples of such open content licences include the Creative Commons Licenses and the Open Database License. By definition, a piece of work can only be considered open if it is in the public domain or is distributed under an open (content) licence. The Open Definition of Open Knowledge Foundation further specifies the specific conditions that a licence must satisfy to be called an open licence, such as compatibility with other open licences (Open Knowledge Foundation, n.d.-b).

## **Issues currently associated with the term**

‘Openness’ evokes various connotations in socio-technical contexts, including but not limited to interoperability between computer systems in a network as well as the freedom of users to access, modify, and (re)distribute source code, expressive works, or datasets. It also suggests a participatory and interdependent mode of

(co)production; sharing tangible and intangible resources; greater civic engagement as well as greater accountability of the duty-bearers; alternative governance models; a socio-cultural movement against enclosure and monopoly; an organisational paradigm characterised by dissolving boundaries or reducing barriers to facilitate innovation, amongst others.

The prime example that has generated much academic and business interest in the participatory mode of production or peer production is the Free/Libre Open Source Software (F/LOSS) development that emerged in the 1980s. Although neither the word ‘participation’ nor ‘participatory’ appeared prominently in the open software licences released by the key actors of F/LOSS. This participatory mode of production makes the (co)creation more community-based with a communal sense of ownership. It should be noted that open participation in the F/LOSS context mostly refers to contribution but not necessarily to governance, which is another issue (Raymond, 1998; Kreiss et al., 2011).

Beyond open participation and mode of production, diverse conceptions and disparate phenomena in the name of open can also be found elsewhere, one of which is the emerging phenomenon of Open Science that gained prominence in the mid-2000s. Here, the meaning of ‘open’ ranged widely, from advocating open access to existing scientific publications to suggesting open availability of scientific data, to a more open process of peer review, or opening up participation by “non-scientists” in research and knowledge production (Mirowski, 2018).

Another usage is Open Government. It has an older history than the previous terms discussed so far. Open Government, which is closely related to participatory government, first emerged around the 1950s in the US and was used by reformists to criticise the then opaque government in the post-World War II era (Yu, 2012; Wirtz and Birkmeyer, 2015). The term can be seen as a synonym for “accountable government” or “transparency government” and it implies how citizens shall have public access to previously undisclosed government information. In more recent years, innovations in digital technology also brought civic “participation” or civic “engagement” into the connotation of open government. For example, the OECD defines open government as “a culture of governance that promotes the principles of transparency, integrity, accountability and stakeholder participation in support of democracy and inclusive growth” (OECD, 2016). The Open Government Partnership, a multilateral organisation, also identifies “effective participation” as the first principle of open government (Burle et al., 2016).

Following the emergence of open government initiatives in the US and worldwide

(Kitchin, 2014), as well as open-related movements facilitated by the enabling tool of the internet for data sharing (Yu, 2012), the term Open Data gained prominence. Although the origin of this term can be traced back to discussions in science policy in the 1970s (Yu, 2012), it did not gain momentum until the initiative for open data in the late 2000s. The word 'open' in Open Data emphasises free access to public sector information. Hence, it is often used as a synonym for Open Government Data. The W3C, the World Bank, and the European Union principally agree that Open Data must be freely accessible, reusable by everyone, and based on open licences (Open Knowledge Foundation, n.d.-a).

In public policy, the term Open Internet is often associated with the debates on net neutrality. Its usage can be traced back to the FCC Open Internet Order of 2010 in the US, while the Telecommunications Act of 1996 foresaw the Internet as an open platform for competitive information services. The term refers to how the Internet's architectural design and operation made it technically decentralised. For example, the layered nature of the Internet ensures that the modification of one layer of the Internet does not impact the other layers. The end-to-end design principle places the power and functionality of the network at its edge. The Internet Protocols ensure that the network can convey a packet of data without knowing its content. This ensures there is "no central gatekeeper to exert control over the Internet" (Cerf, 2009). As such, its architecture enables different devices to connect to the networks, and the networks can interoperate with one another (West, 2016).

By extension and in the human context, Open Internet has been used to refer to the freedom for all to communicate over the network. In this sense, 'openness' advocates lowering the cost of access to increase affordability for the population at large (West, 2016).

In the corporate world, openness refers to the engagement of stakeholders across the value chain (Chesbrough, 2003). To enable open innovation, firms, customers, universities and start-ups readily collaborate with one another and use a more open business model. A business model is how the firm, based on its long-term vision, operates on a daily basis (Tyagi, 2020). The concept of 'openness' and the structure of an enterprise are closely interwoven. Viewed from this perspective, 'openness' is a "higher-order concept" (Schlagwein et al., 2017). This implies easy access to resources, open processes, and overall, a "democratic" opening up of the production process.

Openness herein refers to the process of "democratisation of innovation", whereby one sees a continuous feedback loop amongst the firms, its products and its con-

sumers. Herein, one sees continuous interaction between the users and the firm, whereby users continuously feed into research and development (R&D) and the production process to create better and more innovative products, that in turn are widely adopted, manufactured, and further improved by the firms (von Hippel, 2005). Moreover, repeat iterations and interactions amongst creators and users over prolonged periods of time create these fine innovations. This is not to underplay the contribution of the individual inventor, it is to emphasise that the heroic individual inventor is but one key in the process of innovation.

Interestingly many of the revolutionising technologies that we see today, developed outside the patent system. As the systems developed, for example, as in the case of aviation, aggressive patenting activity put a cap on the group innovation activity (Bessen & Nuvolari, 2011). Overall, this indicates a complex interplay between patents, knowledge sharing, and open innovation. Complex products and systems (CoPS) refers to a complex, high-value goods such as aircraft engines, telecommunications, and flight simulators. In light of high levels of customisation and post-purchase personalised requirements, such systems are designed in an open and accessible manner. The design here is the enabler of efficient allocation of tasks amongst the network of suppliers, and in that respect facilitates open innovation (Acha, 2008).

## Existing misconceptions and biases

Paradoxically, while openness may be used to invoke ideals like inclusiveness, equity, liberty, or transparency, the term does not necessarily lead to the implementation of such ideals or the assumed goodness of such ideals.

For example, two issues have generated debates in the public discourse and academia about F/LOSS projects: gender gap and governance. While the F/LOSS movement is known for its inclusive and collaborative working style, an Open Source Survey shows that only 3% of the total contributors are female (Github, 2017). Lee and Carver (2019) identified sexism as the key problem alongside male-dominating perspectives that created obstacles for gender-balanced contribution. On governance, when examined through a sociological lens of bureaucracy, notably Max Weber's account, it shows how the governance mechanisms of participatory or peer production championed by F/LOSS projects might not be as liberal or liberating as many theorists suggest (Kreiss et al., 2011).

Furthermore, Openness often suggests a particular kind of transparency that focuses on the exposure of politicians and bureaucrats for public scrutiny. However,

as legal scholar Roberts (2015) argued, a call for transparency is not always about more openness but can be a call for the openness of a new type or a new focus as the architecture of the government changes, such as its size and complexity. Such openness sometimes provokes new worries about administrative changes. In such cases, the demand for openness is not simply about more transparency but the overhaul of oversight mechanisms to keep up with transformations in the bureaucracy.

Beyond the above ideals, certain adversarial practices have been identified by scholars and practitioners as Openwashing. Thorne (2009) who coined the term defines it as “to spin a product or company as open, although it is not.” As more commercial products, services, and resources are calling themselves ‘open’ but doing the opposite, the term has gradually been devalued or lost its meaning. While such practices of Openwashing have generated much criticism (World Wide Web Foundation, 2016; Heimstädt, 2017), Pomerantz and Peek (2016) offered a positive take by suggesting how it increased awareness about the term ‘open’ and prompted practitioner communities to develop more strict criteria to define what it means to be ‘open’.

## Conclusion

As our search for definition underscores, openness is contextual. The motivations for designing or practicing openness in the digital realm tend to be enabling or supporting better communication between previously closed systems and to increase capability for the greater number to benefit. In other words, the drive is to scale up. Such enabling and capability-enhancing function and meaning can imply access to resources that are otherwise closed or restricted in degrees; it can also refer to a more participatory and interdependent mode of production.

The nature and extent of openness depend on the context and/or the disciplinary domain. Paradoxical as it may sound, openness does not necessarily lead to inclusiveness or equity, even though it may be used to invoke such ideals.

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