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# “Openness” With and Without IT: A Framework and a Brief History

**Daniel Schlagwein** (corresponding | schlagwein@unsw.edu.au)
UNSW Sydney, Australia

**Kieran Conboy**
NUI Galway, Ireland

**Joseph Feller**
University College Cork, Ireland

**Lorraine Morgan**
NUI Galway, Ireland

**Jan Marco Leimeister**
University of St. Gallen, Switzerland and Kassel University, Germany

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**Abstract:** Over the past two decades, openness (e.g., 'open' innovation, 'open' education and 'open' strategy) has been of increasing interest for researchers and of increasing relevance to practitioners. Openness is often deeply embedded in information technology (IT), and can be both a driver for and a result of innovative IT. To clarify the concept of 'openness', we provide an overview of the scope of cross-disciplinary research on openness. Based on this overview, we develop a framework of openness, which proposes a higher-order concept of 'openness' characterised by transparency, access, participation and democracy. The framework further distinguishes open resources, open processes and the effects of opening on particular domains. To provide the historical context and to appreciate the role of IT

in openness, we discuss two historical examples of openness: the introduction of an open science model in academia (openness without IT) and the emergence of open source software development (openness with IT). We conclude by highlighting some concerns with and limitations of 'openness'.

**Keywords:** Openness, information technology, transparency, access, participation, democracy, open resources, open processes, open science, open source software development, concept development, framework.

## 1. Introduction

This special issue is on openness and information technology (IT). In the call for papers, we defined "openness" broadly in terms of "accessibility of knowledge, technology and other resources; the transparency of action; the permeability of organisational structures; and the inclusiveness of participation". We further discuss our definition of openness in this editorial. In line with the mission of the *Journal of Information Technology*, we were particularly interested in the symbiotic relationship between openness and IT: it is our hope that this special issue contributes to an increased understanding of this relationship.

Understanding the relationship between openness and IT is important. Openness can be a driver for, or a consequence of, new IT. Open phenomena and IT are often inseparable. That is, openness is often so deeply embedded in IT that it cannot be meaningfully analysed and discussed separately from the IT platforms on which and through which open phenomena take place. Open phenomena such as open source development and crowdsourcing (sourcing ideas or work from Internet crowds) are not merely "supported by" IT; they are "shaped by" IT (Majchrzak and Malhotra 2013). In other words, IT is not some sort of passive background to open phenomena but is central to those phenomena. Although this relationship between openness and IT is widely acknowledged in other disciplines (e.g., Peters and Britez 2008), it is of specific concern to scholars of information systems (IS).

Consequently, over the past decade, increasing interest in openness has become evident among IS scholars. Evidence of this interest can be seen in conference tracks (e.g., the track on "Openness and IT" at the European Conference on Information Systems [ECIS], 2013–17, which underpinned this special issue);

conferences (e.g., the International Federation for Information Processing [IFIP] Working Group 2.13 Open Source Software conference series); journal special issues (e.g., Crowston and Wade 2010; Whelan et al. 2014); and the formation of the Association for Information Systems (AIS) Special Interest Group on Open Research and Practice (SIGOPEN).

In this editorial, we first provide an overview of the topics and hence the scope of the research on openness. This is followed by the discussion of a framework for openness. After that, we consider the role of IT in openness through historical examples of openness with, and without, IT. We conclude with an overview of the papers included in this special issue.

## 2. Topics of Research on Openness

During the five years in which we have chaired the track on "Openness and IT" and now the editing of this special issue, the editorial team members have handled over 180 manuscripts. Reflecting on the range of topics of these manuscripts and in the wider literature on openness, we find that scholars consider openness to incorporate and apply to a broad range of phenomena. The boundaries are not clear-cut and, in some cases, one can contest whether the phenomenon in question really qualifies as "open".

Forms of co-creation in online communities involving resources, processes and outcomes that are all "open" provide some undisputed cases of openness. Cases include open source software development such as that of Linux (Benkler 2002) or Apache (Lakhani and von Hippel 2003). Other cases include open content co-creation such as that of Wikipedia (Germonprez et al. 2011). Multiple concepts have been suggested as capturing the essence of open co-creation. Yochai Benkler focused on the communal and non-proprietary production model of open co-creation and called it "commons-based peer production" (Benkler 2006). Others have focused on the novel approaches to the division of labour and integration of efforts used in open co-creation and studied them as "new forms of organizing" (Puranam et al. 2014).

Openness has value for traditional organisations and businesses. For example, open innovation has been posited as the systematic sourcing of external knowledge for

improved organisational research and development (R&D) and, hence, innovativeness (Chesbrough 2003; West et al. 2014). Furthermore, organisations can "open source" their software development, and work with open source communities on software that is of commercial interest to them (Ågerfalk and Fitzgerald 2008). Open participation processes such as crowdsourcing are being used by organisations to create or improve products and services (Orlikowski and Scott 2015). For instance, organisations such as Dell (Di Gangi et al. 2010), LEGO (Schlagwein and Bjørn-Andersen 2014), SAP (Leimeister et al. 2009) and Starbucks (Gallaugher and Ransbotham 2010) have used crowdsourcing to capture customer feedback or to advance their products and services. In addition, crowdfunding has become a way for entrepreneurs to fund new business ventures (Kuppuswamy and Bayus 2013). Sharing economy models, for example, peer-to-peer exchanges which are often facilitated by commercial intermediaries such as Uber and AirBnB, are also associated with the wider openness phenomenon (Nickerson et al. 2016; Sundararajan 2016).

In addition to the above examples of "external openness", open principles have been used within the confines of traditional organisations. For example, the adoption of open source principles within corporate environments, sometimes called "inner source software" (Stol and Fitzgerald 2015), has become popular among many organisations (e.g., Philips Healthcare, Ericsson). The benefits of opening up agile development processes with agile teams collaborating in intra-organisational open innovation networks have also been highlighted (Conboy and Morgan 2011). Furthermore, the idea suggestion boxes in the cafeterias of old have been replaced with internal crowdsourcing platforms, the topic of an emerging research stream (Zuchowski et al. 2016). "Open strategy" is a form of internal crowdsourcing in which strategy is developed in a transparent and inclusive manner (Hautz et al. in press; Tavakoli et al. in press). Enterprise social software supports a range of other "open" approaches within organisations (Leonardi et al. 2013; Schlagwein and Hu 2017).

Openness is also central to the creation of "platform"-based innovation and the corresponding business ecosystems (Benlian et al. 2015; Eisenmann et al. 2009). Open resources and technologies (e.g., open application programming interfaces [APIs] and open standards) are often central to inter-organisational forms of value

creation and the formation of ecosystems of interdependent organisations (Morgan et al. 2013; Tiwana 2014). Examples of such ecosystems are the “app ecosystems” around the open APIs of Google, Facebook and Apple.

Openness has been researched with a focus on particular domains and areas of society. “Open government” is about governments making information transparent and processes participatory and collaborative (Feller et al. 2011; Obama 2009). As a consequence, open data are often considered the key foundation for open government (Janssen et al. 2012). Openness has historically been central to academia and “open science” (see below for further details). Information technology (IT) now enables new open approaches for conducting research such as citizen science (Levy and Germonprez 2017; Wiggins and Crowston 2011). In terms of the publication of research findings, a long-standing argument has been made in support of open access (Suber 2013) which, with IT, is much easier to achieve. In relation to education, various approaches and frameworks for open education have been proposed (Peters and Britez 2008), including IT-enabled open approaches such as massive open online courses (MOOCs).

The above overview presents the scope of the research on openness. It also provides an intuitive sense of what, typically, is meant by “openness”. However, we find it useful to articulate a more nuanced conceptual understanding of openness.

## 3. A Framework for Openness

Many overlapping definitions and uses of the attribute “open” and the noun “openness” have been proposed. The literature on openness has produced multiple understandings and conceptual ambiguity as to what is meant by openness (Dahlander and Gann 2010). In some cases, disputes (including between authors and reviewers) have arisen about whether something is indeed “open”.

It is not our intention to impose a “correct” definition of openness. Instead, we aim to provide a framework that scholars will find useful in articulating and locating their understanding of openness, while appreciating the interpretations of others.

What do people mean by “openness”? Across the openness literature, “open” and “openness” are used to describe different aspects and relate to different referents.

Open terminology can refer to a higher-order concept (e.g., the "philosophy of openness"); the nature of resources (e.g., "open data"); the nature of processes (e.g., "open innovation"); or the effects on specific domains (e.g., "open education"). We illustrate these different uses and meanings of open terminology in Figure 1.

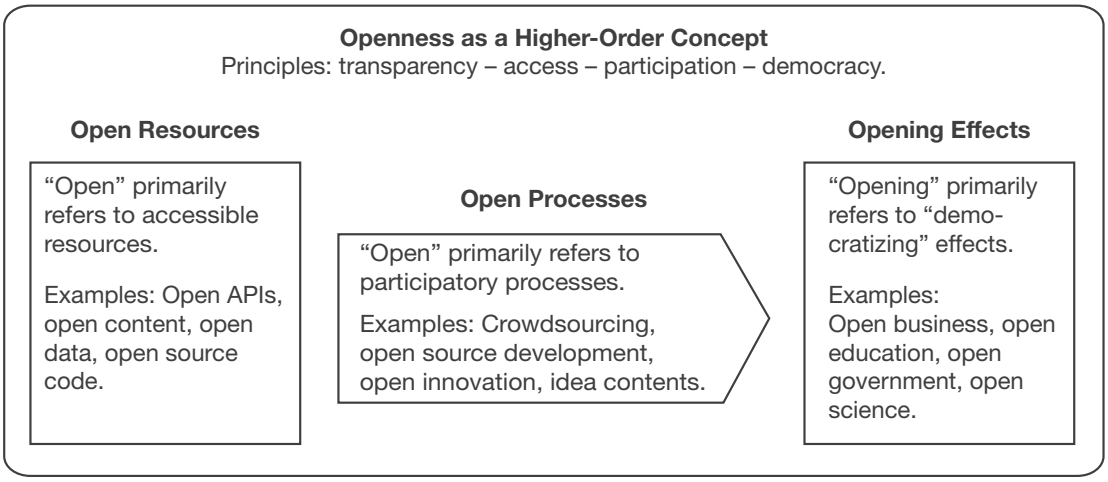



**Figure 1: A Framework for "Openness"**

As indicated on the top of Figure 12, many uses and definitions (including those we specified in the call for papers) refer to aspects or principles of "openness" as a multi-dimensional, higher-order concept. This higher-order concept is sometimes referred to as a "philosophy" (Peters and Britez 2008), a "dogma" (Mayer 2016) or a "paradigm" (Chesbrough 2003). The principles typically used to characterise this higher-order concept are: access to information and other resources; participation in an inclusive and often collaborative manner; transparency of resources and actions; and democracy or "democratization" such as the breaking up of exclusionary structures. The opposite of openness is closedness which is characterised by secrecy, exclusivity and "proprietary ownership". This conceptualisation of "openness" is, of course, a Weberian "ideal type" (Weber 1904), an archetypical and stylised conceptualisation of a particular idea.

As indicated in the left column of Figure 1, open terminology, in many of its uses, refers more concretely to the nature of a resource, usually an information resource. What makes a resource open is that it can be widely accessed and used. For example, what makes source code "open" is its public accessibility (Gacek and Arief 2004; Goldman and Gabriel 2005), while what makes APIs "open" is that they can

be accessed and used by anyone (Benlian et al. 2015; Boudreau 2012). In short, openness here primarily means accessibility, with transparency implied as people cannot access what is hidden from them.

As indicated in the centre column of Figure 1, open terminology, in other cases, refers to the nature of a process. What makes a process "open" is that the ability for people to take part in the process is widely shared. For example, what makes crowdsourcing an "open" process is its definitional "open call for participation" (Howe 2008). Open innovation is an "open" version of the R&D process (Chesbrough 2003) while open source development is an "open" version of the software development process (Feller and Fitzgerald 2002). Participation could be collaborative or competitive but, regardless, it is open to many participants. In short, openness here primarily means participation and inclusiveness, while wide participation in a process implies high levels of transparency.

Finally, as indicated in the right column of Figure 1, open terminology may refer to intended effects in a particular domain or area. Framings such as "open government" (Obama 2009), "open business" (Chesbrough 2007) or "open science" (Nielsen 2011) neither refer to the overarching concept, nor to a particular resource nor to a particular process. Instead, these framings focus on the (intended) "opening" effects on the domain or area. What is typically intended is the "democratizing" of the domain, thus reducing exclusivity and proprietary ownership. For example, open education refers to a commitment to a long-standing ideal of removing barriers to education. Openness here implies particular social and political values oriented towards democracy, equality and liberalism (see Peters and Britez 2008, particularly chapters 1 and 2). This meaning of openness is in line with Popper's notion of an "open society" (Popper 1945).

While many open phenomena are "open" in respect to all of these components (resources, processes and effects), this is not always the case. For example, open resources may or may not provide "architectures of participation" (Baldwin and Clark 2006; O'Reilly 2004) for open processes. Open source code can, in many licensing regimes, be reused for proprietary software development (open *resource*, closed *process*). On the other hand, while crowdsourcing is not typically based on a resource that can be openly accessed and used by anyone, it is nonetheless a

process of open participation (closed *resource*, open *process*). Furthermore, the long-standing dispute between the free/libre software movement and the open source movement (see below for more details) can be understood in terms of the framework. The dispute essentially revolves around whether the commercial reuse of open source code should be possible. The free/libre software movement's primary concerns certainly include domain *effects*: This movement is based on a set of values that upholds the view that free software supports computer use and ultimately individual freedom and social progress. In contrast, the open source movement is concerned, in a narrower sense, primarily with the open source development *process*. This movement does not hold a political view on the effects nor does it consider proprietary and commercial software as undesirable per se.

We hope that the above distinctions between the higher-order concept and resources, processes and domain effects as the referents of open terminology provide a useful frame for authors, reviewers and readers through which to more precisely understand the kind of "openness" to which they refer. Of course, these distinctions are analytical only: resources are used in processes that produce effects. The distinctions do not map neatly to all uses of the "open" term, not least because many uses are vague, language is not only diverse but it changes, and practices keep changing as new open models emerge. These caveats aside, we hope that the discussion in this section provides a structure to improve our conceptualisation of openness and our mutual understanding of what research on openness is about.

So far in our discussion, IT has been absent. How do IT and openness relate? To discuss this question, we revisit two striking historical examples of openness: the introduction of an open science model in academia (openness without IT) and the emergence of open source software development (openness with IT).

## 4. Openness without IT

Many of the above IT-based open phenomena correspond to historical, non-IT-based open models and approaches. The transition from a closed model of science to an open model of science can be considered as one the most impactful uses of openness. As academics and scientists, we are accustomed to open science; for example, papers are published, peer review is performed, methods and findings are

transparently described, etc. Science and academia, however, for the longest period of their existence—from Greek antiquity and Plato's original Akademia founded in 385 BC through to the 17th century—were not organised in an open model.

In medieval times, research data and methods were typically not revealed, findings were described vaguely, and many lectures were held in the dark to prevent audiences from taking notes. Scientists such as Galileo described their findings in unreadable anagrams and cyphers so they could later claim priority in discovery should someone else replicate their findings, without revealing the actual findings (Nielsen 2011). Famous disputes emerged as a result (e.g., between Kepler and Galileo about planetary observations, and between Newton and Leibniz in regard to who invented calculus). In the field of alchemy, for example, it was common to claim results (including the proverbial "transmuting lead into gold") but descriptions of the corresponding methods and experiments were fiercely guarded. In alchemy, knowledge was seen as divine and hence to be closely guarded (David 2008). It is no surprise that the discipline of alchemy made little or no progress.

The general idea behind closed science was that scientists and experts would be "losing" knowledge and power through sharing it. The reasons for this closed approach were manifold. They included the intention of scientists to find a way to commercially use what they had discovered (Nielsen 2011), the necessity to impress their sponsors (patrons such as the Medici family) through exclusive knowledge (David 2004) and, of course, the lack of a culture and structure for openness (e.g., the concept of peer review, journals, societies, etc. did not exist as an alternative model for science until the late 17th century, and did not become its dominant model until the 18th century). We can see this "closedness" as a competing, closed, paradigm in relation to the conduct of science.

In the Enlightenment, this closed paradigm was challenged and eventually overcome. The "invisible college" was formed in London in 1646 (Crane 1972; de Solla Price and Beaver 1966). This group promoted an alternative approach for disciplines such as alchemy (with this discipline gradually replaced by today's discipline of chemistry). Their key idea was to generate new knowledge by building on the findings of others. Hence, they argued for "open access", that is, the publication of detailed and replicable descriptions of methods and findings. The

“invisible college’s” motto, *nullius in verba* or “words alone are worth nothing”, eventually became the motto of its institutional successor, the Royal Society, founded in 1660. Increasingly, academia and universities embraced this open principle. Scientists started publishing their methods and findings for others to build on in an “open science” landscape. Journals started to emerge with the first being the *Philosophical Transactions of the Royal Society* in 1665. The number of journals rapidly increased with the new model coming to dominate academia. The general idea of generating new knowledge through sharing knowledge in science can be described as the first domain that fully used principles of openness.

The change towards openness is often considered as being due to the increasing complexity of science. Historical research suggests, however, that the change to the open science model was based less on a recognition of the overall usefulness of the open approach (as one might have expected with the benefit of hindsight). Instead, due to the increasing complexity of inquiry and mathematical models, patrons had less and less ability to assess if what their sponsored scholars were doing was “science” or “charlatanry”. They started to demand peer review to confirm that their money was well spent and that their patronage was protected from ridicule (should they be found to be sponsoring a charlatan). This aspect, the actual socio-economic organisation of science at the time and not an epistemological concern, was the key reason for the introduction of peer review and the open science model (David 2005; David 2004; David 2008). This historical account aligns with the observation of generational and paradigmatic shifts in how science is done over time (see also Berger and Luckmann 1967; Kuhn 1970). It points to the general lesson that open models come into place based on, and affect, various aspects of society, economy and “ways of life”, and need to be understood and evaluated as such (not only by their assumed inherent qualities).

“Open science” became the default way of doing science in academia and can be seen as one of the greatest successes of openness. One of the central strengths of openness—the ability to access and freely build on the work of others—was successfully leveraged in open science. Here, open access to resources, the publications in journals that are circulated to universities, societies and libraries worldwide, was critical. The case of open science shows that openness is possible without IT (understood here as digital information technologies). Open science, of

course, required technological infrastructure (e.g., postal services which, coincidentally, had significant uptake in Europe in the 17th century, or the invention of the printing press by Johannes Gutenberg in the 15th century). Many aspects of the open science model, such as peer review, open access, data sharing etc., may now be further opened up using digital information technologies (Hardaway and Scamell 2012; Suber 2013; van der Aalst et al. 2016).

## 5. Openness with IT

One of the earliest and most striking cases of "openness with IT"—and not possible without IT—is open source software development. Naturally, any form of software development is based on IT, but IT takes on a particular coordinating and generative role in open source software development. As a result, this case helps us to understand the role of IT.

When the first computer systems were distributed in the 1950s, it was common to share software source code. Hardware (e.g., IBM's mainframe computer) was considered to be the actual product with software seen as a by-product. In other cases, researchers and academics, who were already operating under an openness model, generally shared the code they wrote.

However, the period from the 1960s to the 1980s saw an increase in proprietary software with closed source code. This closedness was possible due to the technical nature of the way that programming language compilers work (translating human-readable source code into machine-executable code that cannot be easily translated back to the original source code). With the multiplication of the number of applications and their complexity, the idea of "stand-alone software" was born. The period saw the emergence of commercial software producers (e.g., Microsoft in 1975). (Ceruzzi 2003)

The free/libre software movement emerged in the mid-1980s as a response to proprietary software (Stallman 1985). Central to the free/libre software movement is the intention of making software free ("free as in free speech, not as in free beer"). Initiator Richard Stallman followed the idea to launch a completely free operating system. For this purpose, the GNU General Public License was developed and published (the first version in 1989). The central concern of the free/libre software

movement, based on ideological grounds, is to replace proprietary software with free software (Feller and Fitzgerald 2000). Proprietary software is seen as inherently immoral, preventing users from fully controlling their computers while hindering overall societal progress in favour of particular commercial interests. The free/libre software movement advocates for source code and programs to be freely available for use, distribution and modification by anyone.

The vision of a free operating system became a reality with the development of the "Linux" kernel by Linus Torvalds in 1991–92. Notably, Torvalds announced his ongoing development to an Internet mailing list, leading to increased development support by others and the eventual formation of the Linux development community. This IT-based collaboration on source code is what we would now call community-based open source development (Lee and Cole 2003), that is, software developers creating software globally in a voluntary, distributed fashion based on publicly available free source code.

Eric Raymond presented a paper called "The Cathedral and the Bazaar" (Raymond 1999) at several conferences in 1997. The paper reflected on the nature and benefits (e.g., "given enough eyeballs, all bugs are shallow") of jointly developing software based on publicly available source code. The impact of the paper was immediate, inter alia leading Netscape to release its proprietary source code of Netscape Communicator as open source code (the foundation of today's Mozilla Firefox). The term "open source" was adopted based on a discussion at the O'Reilly Freeware Summit (later called Open Source Summit) in 1998.

The free/libre software movement and the open source movement share the open development model (accessible code, participatory development). As previously described, they differ in regard to their expectations of how open source code is to be used. Many "open source" licences are "permissive" in that they allow for commercial use of the code, while "free software" licences such as GNU prohibit commercial reuse. The free/libre software movement is also associated with strong moral concerns and a progressive/left political orientation, while the open source movement is more neutral and more "business friendly". Open source has been embraced by commercial firms such as IBM (Samuelson 2006). Indeed, many open source developers today are paid by firms (Capra et al. 2009) and firms often

exercise substantial control through various measures (e.g., Google has a substantial impact on the direction of Android).

The way in which IT, and especially Internet technologies, are used in open source software development is remarkable. For example, Internet technologies allow for highly efficient access to source code. They make actions and changes to the source code visible and traceable. Internet technologies enable highly efficient ways for distributed people to coordinate and jointly develop code, while substantially reducing transaction costs for software development (Benkler 2002). The extremely low transaction costs make it possible to activate the particular interests of individuals for particular implementation work (Howison and Crowston 2014) and to source distant ideas for focal projects (that may never have surfaced in closed source development). It is this "distant search" mechanism that has been argued as being central to the effectiveness of open, participatory processes such as crowdsourcing (Afuah and Tucci 2012; Jeppesen and Lakhani 2010).

Furthermore, we need to recognise that IT (especially software) is highly malleable and generative. Genuinely new IT applications, systems and business models are created all the time (TCP/IP, peer-to-peer file sharing, sharing economy models, etc.). The potentially low transaction costs of IT can only be used if such new models and systems are generated based on emerging technological possibilities and creative thought. Thus, IT is generative for new forms of openness. For example, the development of online code repositories such as SourceForge (in 1999) and, later, that of distributed version control systems such as Git (in 2005 with GitHub launched in 2007) substantially helped both the development and the distribution of open source software.

Through the low transaction costs and high malleability offered by IT, openness can now be enacted in many more domains. Through IT, the general principles of openness (transparency, access, participation and democracy) are made fundamentally more efficient. Hence, IT has improved and transformed existing open models or has created genuinely new open models that previously were simply not conceivable.

## 6. Papers in this Special Issue

We now turn to the papers included in this special issue. The introduction provided above to the topic of openness and IT may help us to locate these papers within a larger framework.

For the special issue, we received 49 submissions that used a wide range of qualitative, quantitative, design and conceptual approaches. From these submissions, we finally accepted four papers, following several rounds of review, feedback and revision. Each makes a significant contribution to our understanding of the relationship between openness and IT, the key interest of this special issue.

Flath, Friesike, Wirth and Thiesse in their paper "Copy, Transform, Combine: Exploring the Remix as a Form of Innovation" are interested in the art and practice of "remixing" open contents. Their analysis is based on Thingiverse, an open 3D printing platform, which allows its users to create, share, access and, hence, to remix digital 3D print designs. Using six years of quantitative data on models and users, their findings help us to better understand the role and patterns of remixes in open design communities. The paper's topic is fascinating as it shows how IT can bring openness to new domains (in this case, physical objects) and can explicitly trace the patterns of the open "building on each other" process referred to above. Thus, the analysis contributes to our understanding of open resources (e.g., the platform characteristics) as well as open processes (e.g., the remix patterns).

Gleasure, O'Reilly and Cahalane in their paper "Inclusive Technologies, Selective Traditions: A Socio-Material Case Study of Crowdfunded Book Publishing" focus on crowdfunding in traditional industries. Unbound, a United Kingdom (UK)-based publishing company, uses crowdfunding technologies to help authors raise the funding necessary to publish their books. In their study of the case, the authors focus on socio-material practices, identifying the practices of fundraising, maintaining publishing standards, making creative contributions and motivating backers. The analysis identifies the multiple, entangled material, social and cultural aspects of open practices. In addition, the authors show how principles of openness (here, participation and inclusiveness) may conflict with principles of the domain (here, selectivity and exclusiveness) in which they are enacted.

Wessel, Thies and Benlian in their paper “Opening the Floodgates: The Implications of Increasing Platform Openness in Crowdfunding” focus on the role of openness in the creation and maintenance of platforms and ecosystems. In particular, they are interested in the balance between openness and control. They compare Kickstarter data before and after a policy change that relaxed the screening process for new campaigns and, hence, increased the platform’s openness (in the form of access for potential campaign creators). Their analysis shows mixed effects and outcomes of this modification of openness. On the one hand, Kickstarter’s immediate revenue surged due to an increase in the number of campaigns launched. On the other hand, the same increase also meant higher uncertainties for both campaign creators and backers. Creators were faced with a worsening campaign-to-backer ratio and lower campaign success rates. Backers had difficulty in finding campaigns of sufficient quality. The authors conclude that increasing platform openness may, in certain scenarios, destabilise platforms and ecosystems. The paper shows how a reconfiguration of resource openness corresponds to process changes and, ultimately, (business) effects.

Curto-Millet and Shaikh in their paper “The Emergence of Openness in Open Source Projects: The Case of openEHR” explore the unstable and dynamic meaning of “openness” over time. Their analysis is in the context of open development of the specifications of clinical concepts to be used in an electronic health records system called openEHR. Based on qualitative, longitudinal data from the openEHR case (such as mailing list discussions), they identified two intertwined processes, metamorphosis and maturation, that are enacted in the negotiation and construction of the meaning of openness. The metamorphosis process focuses on the mutational evolution of understandings of openness, while the maturation process focuses on the gradual development of a particular understanding of openness. This paper complements this editorial by showing how the meaning of “openness” is not fixed and given but changes over time and context. openEHR focuses on the intended opening effects on the health domain (called “primordial goals” in the paper)—open resources and processes are means to achieve these ends.

## 7. Concluding Remarks

This special issue contributes to our understanding of openness and IT. Some may read this as an endorsement of openness as inherently good and effective. This is

not the case. We caution that openness is not a panacea. The use of "open" approaches may not be effective (openness can and often does fail) or, worse, may have negative effects (unintended or controversial consequences). Therefore, we need to be careful not to exhibit an "ideology of openness" (Gibbs et al. 2013) that presents knowledge sharing and open communication as, by default, desirable and effective. While transparency is considered to be a measure used to hold those in power accountable (such as in open government), the same "open" resources and processes may be used for "1984"-like surveillance measures in a "tyranny of light" (see also Tsoukas 1997; Zuboff 2015). Even from a top-down managerial perspective, transparency may lead to employees focusing on "gaming" the system rather than doing what is actually useful and valuable (Birkinshaw and Cable 2017). Alternatively, creative workers may feel discouraged from developing left-field, deviant and potentially innovative ideas for fear of being seen as wasting time (Bernstein 2012). We certainly encourage further research on the "dark side"—failures and problems, negative, unintended and controversial consequences, and ethical, political and power dilemmas—in the use of openness and IT.

Openness is an important and powerful concept, especially in combination with IT. Key "open" aspects—such as resources access and process participation—can be increased or enacted in entirely new ways through IT. Openness has permeated society. Someone may well read this (open access) editorial on an Android (open source) tablet while looking up entries on Wikipedia (open content) while sitting in a shared ride (sharing economy). The importance of openness cannot be overstated. It is our hope that IS researchers will contribute to increasing our understanding of the fascinating intersection of "old" principles (as in open science) with "new" IT.

## 8. Acknowledgements

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